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THE statistics of accidents in the United States for the last four years, published by the Interstate Commerce Commission in connection with its report on the Westport derailment, and printed in another column, show that collisions, in the 12 months ending June 30, 1912, numbered 378 less than in the year to June 30, 1910, and that the number of persons killed in collisions, 378, was 55 less than in 1910; and the diminution in the damage to cars, engines and roadway was $299,000. Commissioner McChord says, with truth, that the accident record, as a whole, shows a deplorable increase since 1909. But in the years 1910, 1911 and 1912 the railway traffic of the country was heavy and increasing, whereas 1909 was comparatively moderate; and the increase in the items of the accident records may not be greater than the increase in train mileage. The record of deaths, injuries and property losses is deplorable, in whatever aspect it is viewed; but that the collision record should show marked decreases—or even if it were to remain stationary—in the face of such enormous traffic records, is a fact that should be carefully noted; for the improvement, without doubt, is due in large measure to the increasing use of the block system and to improved efficiency in the operation of that system.

AT the recent meeting of the American Society of Mechanical Engineers a report was presented on power tests which included a code for the testing of locomotives, both in the laboratory and on the road. The report was objected to so strenuously that it was referred back to the committee for revision. In the presentation it was explained to have been the product of a subcommittee, none of whose members had had much experience in locomotive work, and that it was offered tentatively, to provoke a discussion that would be of value in the revision by the committee of the whole. The main criticism of the code for laboratory work was directed against the starting and stopping conditions, on the ground that no test was ever made as the committee prescribed, and that it would not be practicable under the normal methods of conducting the work. And it was urged that the conditions used and prescribed for the St. Louis tests, which have been followed ever since, are to be preferred. Almost the same criticism was directed against the road tests, in that the code was not so drawn as to meet practical requirements. The assumption seems to have been made that the two forms of tests could be used interchangeably. This cannot be done, for the time has long since passed when any engineer engaged in the work will contend that road tests can be used with any possible degree of success in determining the efficiency of a locomotive. Road tests were considered to be useful, but they must have other purposes than that of determining the boiler performance and thermal action in the cylinders of the engine; a matter that can only be satisfactorily determined by a shop or laboratory test, so that it was considered to have been a mistake to have constructed the two codes from the same point of view.

"RAILROAD men fight for the right to get drunk." This is a headline which appeared in a New York daily paper this week over an account of a strike on the North Eastern Railway of England. But for the fact that "headline artists" constantly strive to excite their readers, and therefore habitually mix fiction with their facts, the sentence quoted would be startling. But it appears that it is literally true. An engineman was dismissed, or reduced to a lower grade, for intoxication, and his union ordered a strike to get him restored, the argument being that he was not drunk when on duty. Other employees joined the enginemen, and at last accounts *eight thousand* men had left their work. At and around Newcastle traffic was very seriously interrupted, and important industries were suspended. Putting aside for the moment the interests of the parties in this particular case—the people who are inconvenienced, the corporation mulcted for large losses and the employees fooled or impoverished or both—it may be said that probably it is a good thing to have this issue so badly stated. Our English cousins have on numerous occasions given us lessons in clearness both of language and of ideas. American enginemen do not fight for the right to get drunk; but individual enginemen have often harmed themselves—and have destroyed their usefulness as enginemen—by too persistently insisting on the right to do as they pleased when off duty. Is it too much to say that we have here an illustration of what such a radical course leads to? To use the power of your brotherhood to secure the liberty to do as you please in the matter of drinking when off duty may easily develop into a contest in defense of men who drink to excess. In other words the stock argument of the teetotaller, that if you exercise the liberty to drink you run the risk of lapsing into dangerous excess, has a basis in reason; and if an unscrupulous leader should

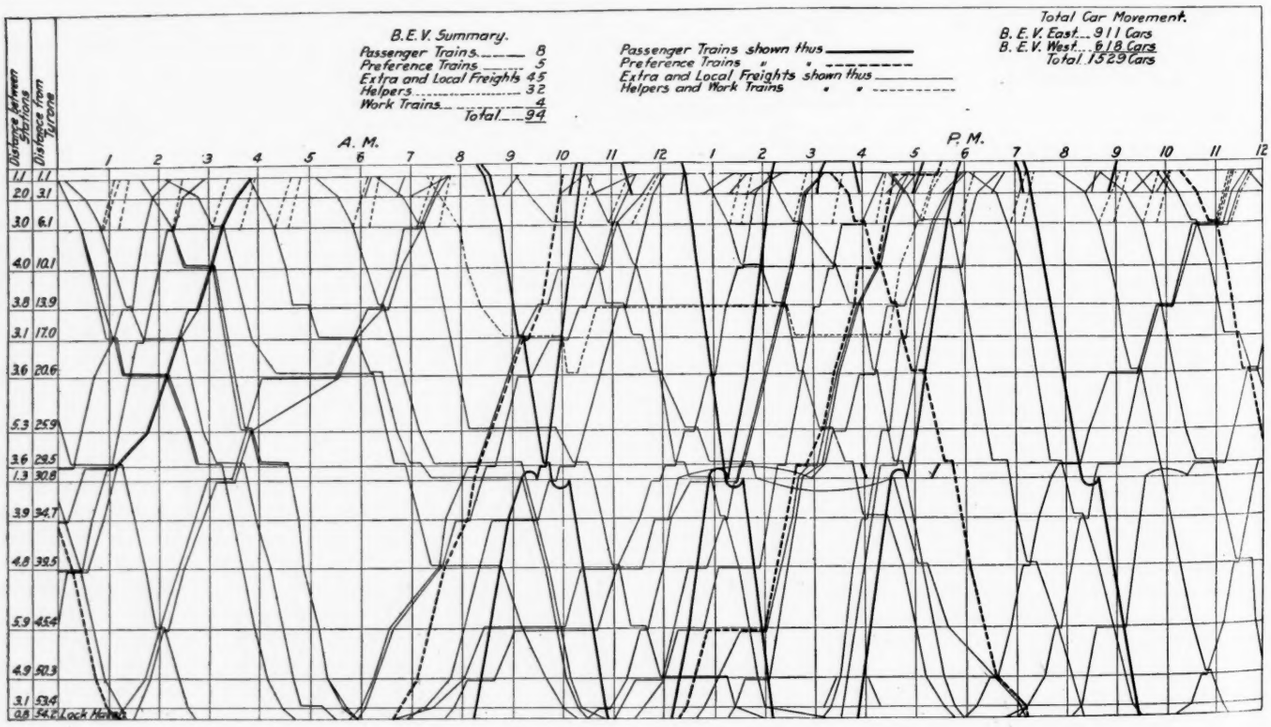
desire to use the reasonable wishes of one man, or faction, to promote the dangerous wishes of another faction of a brotherhood—which often can readily be done—this possibility of a dangerous lapse is multiplied. Fortunately, our Brotherhood of Locomotive Engineers has set for itself in this matter a high standard; and we are not lecturing that organization. But actual individual cases indicate that a tendency to abuse the privileges of membership is not unknown; and it is fair to suggest that the extreme to which these Englishmen have gone in one direction should serve as a warning that he who seeks absolute safety should take an equally extreme course in the opposite direction. The railroad superintendent who feels the responsibility for the lives of thousands of passengers may demand of his enginemen an extreme standard of freedom from brain disturbance, just as reasonably as may the wife of a man who is known to abuse his children when he has taken a single drink. In the locomotive cab the danger from mental inefficiency is extreme; extreme precautions are therefore reasonable. Moreover, it is reasonable for the master of fifty or a hundred enginemen to take a stand more extreme than perhaps would be proper for a single individual, responsible only to and for himself. Human nature is subject to such subtle vagaries, impossible of measurement, that machine methods—arbitrary methods—are not only justifiable but necessary. In other words, a superintendent may rightfully demand of an engineman, without giving reasons, that he be a total abstainer. A prominent western road is reported lately as discharging employees for merely entering a saloon. Whether or not this is true we have not learned; but if the requirement of total abstinence is reasonable the rule to keep out of saloons will work no injustice.

IN another column we print a letter from the general superintendent of the Wheeling & Lake Erie in regard to freight density on a portion of that line. In our issue of November 8 there was a note to the effect that the average tons one mile per mile of road on the Bald Eagle Valley Branch of the Pennsylvania Railroad was at the rate of 6,053,328 per year. This statement was somewhat misleading. It is a fact that during the past eight months the tons one mile amounted to 353,110,735, but this entire tonnage passed over the line between Tyrone and Lock Haven, 54.2 miles, although a small portion of this tonnage originated on the 33.3 miles of branch lines which go to make up the total 87.5 miles of road of the Bald Eagle Valley branch. The figure of 87.5 miles was that used by a Pennsylvania officer in direct answer to a question in regard to freight density. The interesting point, however, is that the average net tons moved over the 54.2 miles of line during the past eight months was 1,004,065 per month, or at the rate of 12,048,780 tons per year. A train sheet for 24 hours beginning February 3, 1913, is shown herewith, and it will be noted that there is about 2 miles of double track at the west end of the line and a half mile of double track at the east end.

GOVERNMENT REPORT ON WESTPORT DERAILMENT.

THE Interstate Commerce Commission, in the case of the Westport derailment, has made a businesslike and comprehensive report, thus carrying out the law of May 6, 1910, in spirit as well as in letter. For the first year it ignored the law. For the second it followed the letter, but to little profit. The recommendations in the present report are the same as those of the Connecticut commission; long crossovers to be introduced, and full stops made at short ones; but with an added declaration that railways should unite to develop automatic stops so that these can be used generally.

Long crossovers are necessary for high speed traffic on four-track railroads; but, as we showed last week, the demand of the newspapers, now backed up by the Connecticut and the federal commissions, that they be generally required by law, is based on a greatly distorted view of the general question of safety in travel. In many cases the cost of introducing them would be so great that the railway could, with the same money, improve safety much more effectually in some other direction. Moreover, the palpable inversion of this remedial process is evident to everyone who looks at the question calmly. The primary fault for this disaster was the neglect or incompetence of the engineman. A fundamental and universal requirement of the engineman's job is to be ready to shut off steam and apply the brakes, instantly, at any point on his run. In other words, the keeping of a constant lookout is vital. With all crossovers made fit for 70 miles an hour, if that were possible, he would still be under the same compulsion to be always wide awake, because of possible dangers from other causes. The prime



Train Chart for Bald Eagle Valley for February 3, 1912.

duty of the superintendent, therefore, is to take every possible means to insure this necessary vigilance on every train. It is not strange that an interstate commerce commissioner, knowing nothing about railway operation, should recommend long crossovers, for the railways themselves have set the example of tackling problems at the wrong end. They pay attention to their discipline, and discipline improves somewhat from year to year, at least on many roads; but it remains true that the subject of mechanical remedies and safeguards is discussed, and comes to the knowledge of the public and of commissioners, while the problem of perfecting the service of enginemen is left in the realm of mystery—except, indeed, as some railway manager comes out bluntly and says that the labor unions prevent him from improving his men. Mr. Horn said that, following the Bridgeport disaster, the New Haven road had "stiffened up the discipline." But Mr. McChord did not find out what this statement amounted to, or whether the stiffening had been really intelligent, permanent and successful. The broad general problem of enginemen's disobedience of signals remains just where it was.

The requirement that at short crossovers all fast trains shall be brought to a full stop will, of course, cause many unnecessary delays. This, like the rest of the report, is addressed to all the railways of the country. However, it is a penalty at which railroads generally cannot enter a very loud complaint, for they themselves, in innumerable cases, all over the country, have set the example of requiring full stops at places where they have lacked the means or the energy to enforce the high state of discipline necessary to justify the use of speed limits instead of full stops. Incidentally, this requirement of the commission may serve to convey to the public the necessary lesson that to have perfect safety in railway travel one of two things is absolutely necessary; either a heavy expenditure of money, or a rigid limitation of speed.

In the matter of automatic stops, Mr. McChord, backed up by the whole commission, makes his own the superficial dictum of Mr. Belnap, that these devices should be generally used. He quotes the guarded and qualified views of the Block Signal Board, and he recommends experiment; but he ends up with an out and out declaration that "railroads should avail themselves of the use of some workable automatic train stop."

If discipline of enginemen cannot possibly be improved, and *if* there is no other way of safeguarding passenger trains, the automatic stop will be the next remedy; but the consideration of the other lines of inquiry suggested by these ifs is an imperative duty, because the problem of the automatic stop is such a difficult one. There will be no trouble in producing a device which will be mechanically satisfactory; but with trains greatly varying in length and speed—that is to say, on all railroads except those which, like the subways, can have every condition favorable—any scheme of automatic stops is very likely to introduce complications so troublesome that, from a governmental standpoint, they should be treated as dangerous complications. The testimony of those who have had most experience with automatic stops is to the effect that their great value is as instruments of discipline. In other words, a completely successful automatic stop would cure all faults of enginemen, and the stop would never act except when the engineman were dead or fainted. And Mr. Cade's scheme would provide, without the automatic stop, for the cases of enginemen falling dead. Discipline of enginemen still remains the crucial problem. Is the automatic stop the only thing that will solve it?

We have said that the present report is comprehensive; but it is deficient in this respect to the extent that it passes over in almost complete silence the question of discipline. However, discipline can be dealt with only by the railroad officer himself, and it cannot be called unfair for the government to say, Improve your discipline or provide something to obviate the evil effects of poor discipline. As the railroads themselves have kept discipline in the background, they can perhaps find no fault if the government does not delve into the subject. The question of the time and expense involved also is one which the commission does not consider, though the railways will be forced to consider it. It takes only two lines at the end of the report to say that the present recommendations, framed to fit a special and rare problem on a road of dense traffic and to punish a supposed flagrant offender, shall apply to every road in the country; but to a road with competent and well-disciplined enginemen this may be equivalent to imposing an unwise expenditure; a use of money which is more clearly needed for some other purpose. For, notwithstanding all the clamor, the Bridgeport and Westport cases are rare.

In its main purpose, of showing that the Interstate Commerce Commission takes an active interest in the safety of railway travel, the present report will be generally commended as successful. It contains some paragraphs which show that the gravity of the situation has been apprehended. But long crossovers and automatic stops combined will fall far short of curing our troubles. Long crossovers make the use of brains less necessary in the locomotive cab, and the automatic stop remedy seems very likely to cost, in added complications, more than it is worth, except in special situations like those where stops are now used. But in the old problem of good discipline we still have room in which to make real progress. Any railway officer who is disposed to lean on the government for the settlement of the intimate and detailed questions of his daily task can again see the futility of such dependence.

CAR SHORTAGES IN THE UNITED STATES AND PRUSSIA.

MANY persons reason that government ownership of railways will be brought about in the United States in this way: The government, they say, will so restrict the return on railway capital that the investment will be insufficient to secure adequate development of facilities. There will then be loud complaints because the roads do not satisfactorily move the traffic. The upshot will be a successful demand that the government acquire the roads and provide the needed facilities itself.

Cable despatches from Berlin published in the newspapers of December 7 show that in Prussia government ownership is not a preventive of car shortages. And be it remembered that the Prussian lines are the best managed government-owned railways in the world. The despatches say that in the great coal region of which Essen is the center, there was a shortage of about 10,000 cars a day during the second week of November, and since then the deficiency has risen to more than 12,000 cars. "The Society of Coal Mining Operators of Essen has issued a statement in which it shows that the Prussian state railways have far from kept pace with the growth of the freight business of the country." It is said that in the last week of October not less than ninety-one coal companies in the Essen district had to lay off entire shifts of miners. In explanation of the situation, a high officer of the Prussian roads is quoted as saying that the recent increases in the traffic have made it greater than ever before, and "that the state cannot invest undue amounts of capital where it will have to lie unemployed for the greater part of the year."

The conditions as respects the growth of traffic evidently are much the same on the Prussian state lines as they are on the American lines, and the results as regards the movement of the traffic are similar. As in the United States, so in Germany, this is not the first time that there have been complaints of car shortages. In 1905 and 1906 the conditions on the Prussian roads were similar to those obtaining now. At one time in the fall of 1905 there was a shortage of about 26,000 cars in the Rhenish-Westphalian Coal Mining district. The consequence was that in 1906 the government decided to spend $50,000,000 for additional locomotives and cars. At about the same time the railways of

the United States were buying more equipment than they ever did before or since in their history. And in both countries, despite these large purchases, the car shortages have returned.

There is one marked difference, however, between the situation in Prussia and that in the United States. In Prussia, the government, being the owner of the railways, is not complaining, but as we have seen, says through a high official of the railways "that the state cannot invest undue amounts of capital where it will have to remain unemployed for the greater part of the year." In the United States there had not been up to this fall a car shortage since 1907, except for one very short period. There have meantime been car surpluses, which lasted almost throughout each year, which usually exceeded 100,000 cars and which rose to more than 400,000 cars.

In the United States, however, the railways are owned by private corporations. Therefore, no railway official dares to say that the railways "cannot invest undue amounts of capital where it will have to lie unemployed for the greater part of the year." Such a statement would be regarded as defiance of public sentiment and of the railway regulating authorities. Nor does any public official come to the defense of the railways. On the contrary, the Interstate Commerce Commission issues a statement which is given broadspread publication in the press, commenting on the situation in the way that indicates that the commission thinks the railways are at fault and making some extremely unpractical suggestions as to how to remedy the conditions.

As one means of expediting the movement of cars some railway officers have suggested reduction of the free time for loading and unloading them and the imposition of higher demurrage charges for their detention. It is interesting to note in this connection that the time allowed for unloading cars in Germany is twelve hours, and at times this has been reduced to ten, eight or even six hours. In the United States the minimum free time allowed for loading and unloading is forty-eight hours. The German cars are much smaller than those used in this country, and therefore, it does not take as much time to unload them. The average capacity of freight cars in the United States is 36 tons, and the average in Prussia is 16 tons. Therefore, the German lines give only one-fourth and sometimes less than one-fourth, as much free time as the American roads do for unloading cars that have almost one-half as large capacity as the cars used in this country. It follows that shippers and consignees in the United States enjoy more liberal demurrage arrangements than they do in Germany under government ownership.

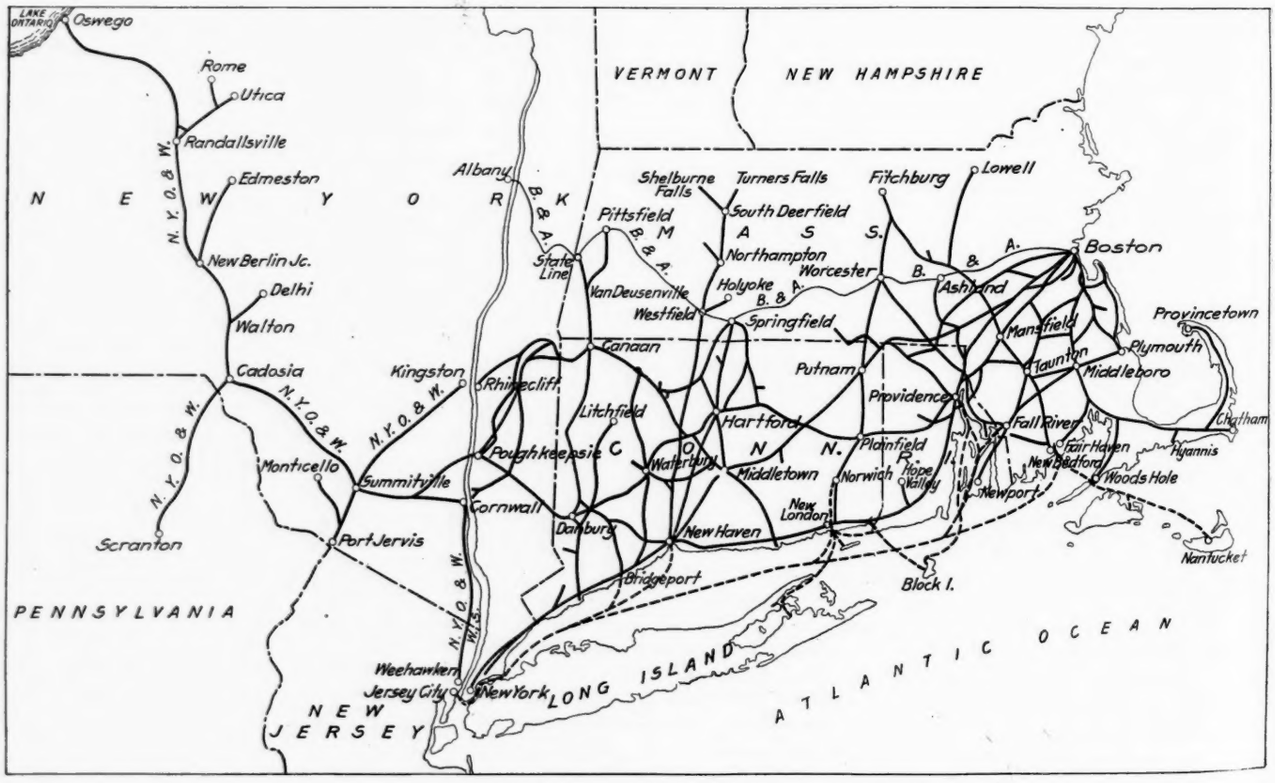
On the whole, no intelligent person will use a comparison of the conditions now existing on the railways of the two countries as an argument for the adoption of government ownership in this country.

NEW YORK, NEW HAVEN & HARTFORD.

THE New York, New Haven & Hartford Railroad Company operates only about 2,091 miles of steam railroad; but the combined income account of the New Haven system, excluding only the New York, Ontario & Western, the Boston & Maine and the Maine Central, shows, in the fiscal year ended June 30, 1912, total operating revenues of $90,642,000, comparing with total operating revenues in the previous year of $87,231,000. Operating expenses, however, were $59,408,000 in 1912, as against $58,070,000 the year before. The system, which includes* the railroad, the trolley lines and the steamship lines, had in 1912 a slight surplus ($306,000) after the payment of 8 per cent. dividends, as against a slight deficit ($313,000) after paying 8 per cent. dividends in 1911. Of the total system revenue, the revenue from operation of the railroad proper furnished in 1912 $64,933,065.

Mr. Clark, who was president of the New Haven until 1900, made improvements to the road and kept its service and property fairly well abreast of the times, but in 1900 Mr. Hall was made president and retained the presidency until Charles S. Mellen was elected in 1904. During these years from 1900 to 1904 the science of railroading in the United States made great

*The subsidiary companies are the Central New England, the New England Navigation Company, the Hartford & New York Transportation Company, the New Bedford, Martha's Vineyard & Nantucket Steamboat Company, the Connecticut Company, the Rhode Island Company, the Berkshire Street Railway Company, the New York & Stamford Company, the Westchester Street Railroad Company and the Housatonic Power Company.



The New York, New Haven & Hartford System.

progress. The Pennsylvania Railroad during these years was spending millions and millions of dollars to keep abreast of the progress of this rapidly developing science. This was true not only of the Pennsylvania, but was true of the great majority of roads all over the country. New standards of rail were being adopted; steel bridges were replacing wooden structures; fills were replacing trestles; new standards of motive power were being tried out, and grades were being reduced. During these years the New Haven almost stood still. Its passenger service was good, but its standards were about the same as they had been in Mr. Clark's time. The result was that when Mr. Mellen took hold in 1904 he had a property which was obsolete. He recognized at once that heavier power was needed; that the property was being worked to the very limit of its capacity, but that it was necessary to change the whole standard of the plant to meet the requirements of this heavier power, and that the essential thing was to pour money into this property until it could be brought abreast of the times; and this has been done.

The New Haven presents almost a unique problem in American railroad operation. Its passenger revenue from the steam road amounted in 1912 to $26,816,000, and its freight revenue to $32,131,000. A road with such a large proportion of its revenue derived from passenger business is under a particularly heavy strain. Nearly all of the companies that allocate expenses as between passengers and freight find passenger business far less profitable than freight. Regardless of whether or not such allocation of expenses can be done *accurately,* the fact that this cost accounting is based on different principles by different roads, each arriving, however, at similar results, is a very strong indication that most roads do not find passenger business proportionately as profitable as freight. The Long Island, the great bulk of the business of which is passenger business, shows a deficit after paying fixed charges.

The average journey per passenger on the New Haven is a little over 18 miles. One reason, of course, for this very short haul is the large commuter business carried out of New York City; but even excluding this, the average haul is short. This fact has laid the railroad peculiarly open to competition from trolley interurban lines. The New Haven is also particularly open to competition by water on both its passenger and freight business. These facts, and the history of the road up to the time that the present management took hold of it, have led to a line of development that is quite different from that followed by most other railroads in the United States.

There is one other consideration that has unquestionably influenced the financial policy of the New Haven. The New Haven's stock is held by a great number of small private investors who are entirely dependent on their income. The list of stockholders of the New Haven has an unusually large number of names of women, and by far the great majority of all the stockholders hold comparatively few shares of stock. This stock was recommended as a safe investment in which a widow or other person wholly dependent on income could safely put money. The management has a duty to stockholders such as these that is rather different from the duties of a management to stockholders of such a road as the Delaware, Lackawanna & Western, for instance, the stock of which is largely owned by a comparatively small group of very wealthy men. The New Haven management should quite properly hesitate very seriously before even temporarily reducing its dividend rate.

Every railroad has to protect itself against competition. In developing its territory it must see that the fruits of the development are not allowed to slip away from it. The New York Central, for instance, found that it was necessary to buy trolley roads in New York state to quite a large extent, and now controls the New York State Railways, which operate 585 miles of interurban and street railway track in New York. This is an example comparable to the New Haven's efforts to protect itself in Connecticut and in Massachusetts. It was the policy of the Pennsylvania Railroad for a number of years to buy sufficient stock in competing roads all through its territory to exert a compelling influence on the policies of these roads.

The present management of the New Haven, when it undertook the task of developing its collection of branch lines, local lines and its main lines paralleling water competition into a really strong railroad system, had to accept one of two alternatives. It could abandon all outside activities and investments and devote its entire energies and credit to steam railroading, or it could develop its territory for itself, include in its system analogous transportation facilities, forestall competition by itself furnishing such service, and do this through the extension of the railroad company's credit to the financing of these outside operations. The management and the directors decided to adopt the latter alternative.

From a superficial examination of the railroad company's showing, in 1912, exclusive of outside operations, it would appear that the operations of the railroad itself would have been highly profitable if the company had not extended its credit and increased its dividend and interest requirements by the acquisition of boat lines, trolley lines, etc.

The New Haven—we are speaking now only of the steam railroad—earned last year $31,049 per mile. Its ratio of operating expenses to total operating revenues was 64.84. The ratio of transportation expenses to total operating revenues was 38.75; of maintenance of way and structures to total operating revenues, 10.52; and of maintenance of equipment to total operating revenues, 12.39. An operating ratio of 64.84 is very low for a road doing such a large proportion of passenger business and carrying such a large proportion of high grade freight moving in small trainloads on a very rapid schedule. The ratio of transportation expenses is fairly high. The ratios of maintenance are quite low. The actual sums spent per mile for maintenance of way and structures are ample.

The high transportation *ratio* and low maintenance *ratio* figures are explained by the facts that on the one hand the difficulties of economical operation are very great, and on the other by the fact that the average ton mile rate is high, due to the nature of the traffic carried. The average receipts per ton per mile in 1912 were 1.371 cents.

The New Haven in 1906 voluntarily reduced all of its passenger fares to a maximum of two cents a mile. The experiment did not prove a success. The New Haven, in company with other roads, had to continually grant increases of pay to labor, and especially to employees in the transportation department; its cost for materials increased; and it, in company with other roads, had to meet the expensive requirements of the interstate and state laws and orders of commissions. In 1911, therefore, the company raised its commutation rates and certain other rates that were found to be out of line; but even with these increases, as was previously mentioned, the present average rate per passenger per mile is 1.720 cents, about the same as on other eastern roads doing a similar passenger business.

The average trainload in 1912 was 292 tons, comparing with 290 tons in 1911. It is this necessarily light trainload that is one of the chief factors in explaining the high ratio of transportation expenses to gross revenue, and the comparatively low ratio of maintenance expenses to gross revenue. There are two factors that determine the operating ratio. One is the average rate per ton per mile and per passenger per mile; the other is the amount of business that can be handled per train mile and per $100 of expenditure. The New Haven has a large proportion of passenger business and a light high grade tonnage. These two factors make the average receipts per unit of business handled high, and make the cost of actually transporting that business (transportation expenses) also high, but do not affect to any great extent maintenance expenses; therefore, the ratio of transportation expenses to revenues is high, but the ratio of maintenance expenses to total receipts is low.

Besides the nature of the freight traffic carried, the freight trainload is very seriously affected by the passenger traffic dens-

ity. The number of ton miles per mile of road per annum on the New Haven was 1,157,000 in 1912. This compares with a freight density on such a road as the Pennsylvania of 4,833,000 tons one mile per mile of road; but, on the other hand, the New Haven carries 759,000 passengers one mile per mile of road, as against 428,000, the passenger density of the Pennsylvania. It is impossible on the New Haven to put very heavy power in freight service, because the freight trains have to be kept continually speeded up to keep out of the way of passenger trains. The tremendously heavy passenger density out of New York City requires the use of all four tracks for passenger service, divided between local and express service, thus adding one more complication to the problem of operation.

This leads us to the considerations that led the management to the course that they adopted in buying up street railway lines and boat lines, and in building the New York, Westchester & Boston. The fact that the railroad itself pays now, and would pay, substantial and ample profit on the investment in the railroad proper, is by no means proof that it would have paid if the management had laid itself open to unlimited competition on its two weakest sides. On the one hand, the great density of the population in the territory traversed by the New Haven, and especially in its territory in Westchester county and southwestern Connecticut, demands and necessitates a cheap, frequent passenger service. On the other hand, slow, low grade freight can be more economically handled between New York and Boston and New York and Maine by boat than by rail, where it interferes with fast freight and passenger service. Furthermore, the New Haven has got to preserve the profits from the local passenger and slow freight business to itself. If the cream of its passenger business and the most economically handled of its freight business were to be taken from it, the railroad might soon cease to show a profit. The management's solution of the problem was to buy and operate its own boats on the sound and to Maine to take care of the slow freight, and to acquire trolley lines in its territory and to build the tremendously expensive, and what is expected to be the tremendously valuable, New York, Westchester & Boston to take care of the local passengers.

In one place in his report this year President Mellen mentions the fact that the boat lines have never been particularly profitable, but have enabled the New Haven to give better service than would have been possible had the business been confined to the rail lines, on account of better deliveries, especially in New York City. This is so obvious a fact that it would hardly need mention if it had not so often been misunderstood. One of the worst dangers of a railroad monopoly lies in the temptation to give inadequate service. Competition by boat lines with the New Haven might well result in disastrous rate wars; but as long as the New Haven operates ample boat service itself, it cannot be charged with giving inadequate service because of monopoly. As to the present financial outlook, the New Haven will, for the next few years, have to bear the very heavy burdens of carrying the New York, Westchester & Boston, paying for the electrification of the road from Stamford to New Haven (although a good part of this work has already been done), and paying interest* on its share of the cost of building the new Grand Central station in New York City. Whether or not railroad electrification will ever pay directly in cheaper cost of operation it is too soon for any one to say. It is one of those improvements which are demanded by the public and which railroads have been forced into regardless of whether or not they are in themselves a profitable development. It may well be, however, that electrical operation may in the end prove highly economical, and in this case the New Haven will in the years to come reap large profits from its present expenditures for electrification.

The New York, Westchester & Boston, the stock of which is owned by the New Haven and the outstanding $17,200,000 bonds of which are guaranteed by the New Haven, is built with the very highest modern standards. Everything that can be made permanent has been so constructed; its upkeep should be very cheap; it runs through a territory that is developing rapidly and that appears one of the most attractive sections near New York City for suburban settlement; its passenger service is frequent and inexpensive; and in time it is expected to develop a considerable freight business. No one can tell now how valuable such a property will become with the development of New York City. Some idea of what this development of a city has meant to the New York Central, with its terminals in the heart of New York, may be gained from the fact that the New York Central and the New Haven expect to be able to earn enough from the rent of the buildings* above the tracks between Fifty-third street and Forty-second street to pay the interest not only on the cost of these tracks, but on the entire cost of the station itself. These plans are described at some length in the *Railway Age Gazette* of March 15, 1912. When these plans are an accomplished fact, the New Haven will be relieved of its present interest charges on the cost of these New York City terminals. As was previously mentioned, it is expected that the development of the city will make the New York, Westchester & Boston, now in operation from the Harlem river to White Plains and New Rochelle, not only no longer a burden, but a source of great profit to the New Haven.

The principal figures for the New Haven system as a whole for 1912 as compared with 1911 are given below. The second table below compares the operations of the railroad itself in the two years.

Combined Income Account.

	1912.	1911.
Total revenue	$90,641,905	$87,230,963
Operating expenses	59,407,632	58,070,456
Taxes	4,949,095	4,682,384
Operating income	27,668,627	25,876,461
Total income	32,456,114	29,380,518
Net income	12,915,503	10,573,402
Dividends	12,609,668	10,886,691
Surplus	305,835	*313,289

*Deficit.

Railroad Income Account.

	1912.	1911.
Average mileage operated	2,091	2,041
Freight revenue	$32,130,892	$30,329,092
Passenger revenue	26,816,435	26,212,671
Total operating revenue	64,933,065	62,153,435
Maint. of way and structures	6,829,361	6,980,036
Maint. of equipment	8,046,992	7,193,425
Traffic expenses	412,880	351,999
Transportation expenses	25,163,819	24,526,959
General expenses	1,650,965	1,846,213
Total operating expenses	42,104,018	40,898,633
Taxes	3,792,872	3,578,363
Operating income	20,424,330	19,076,232
Gross income	30,727,438	28,255,160
Net income	13,385,551	11,187,312
Dividends	14,315,540	12,454,852
Deficit	929,989	1,267,540

NEW BOOKS.

Iron and Steel Structural Work. By Karl Schindler, translated from the German by Charles Salter. Board cover, 5 in. x 7 in., 140 pages, 115 illustrations and numerous tables. D. Van Nostrand Co., New York. Price, $1.25.

This handbook is intended for use in the design of iron and steel frame buildings, the subjects covered in the five sections being columns, girders and beams, roof construction, iron staircases and skylights, floor lights and glazed roofing. Each section includes a discussion of the methods of calculating stresses and sections, and includes the necessary formulae and tables for performing the actual calculations.

*The N. Y. C. & H. R. is building the terminal and the New Haven is assuming no capital liability for the terminal itself.

*The building *above* the tracks are to be financed jointly by the N. Y. C. & H. R. and the New Haven.

Letters to the Editor.

FREIGHT DENSITY.

CLEVELAND, Ohio, November 25, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

My attention has been attracted by editorial comment in your issue of November 8, noting freight traffic density on the Bald Eagle Valley Branch of the Tyrone Division of the Pennsylvania Railroad, and quoting B. A. Worthington on performance of the Wheeling & Lake Erie Railroad for the month of July, 1910. Progress has been made on the Wheeling since the month to which reference is made.

For the first four months of the current fiscal year on the district between Brewster and Pittsburg Junction, the performance was at the rate of 8,152,574 net ton miles per mile of road per annum, the greatest density being in the month of October, when it was at the rate of 8,937,648, or very nearly nine million, so that we are not yet disposed to yield the banner for single track density.

J. G. CODE,
General Superintendent.

LABOR AND THE RAILWAYS.

TOLEDO, Ohio, November 8, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Having read carefully the letters from W. G. Lee (*Railway Age Gazette,* October 4, and October 18), in answer to the one entitled "A General Manager's Remedy for Accidents" (*Railway Age Gazette,* August 18), and one signed "Master Mechanic" (*Railway Age Gazette,* October 4), I beg you to allow me the use of your pages to relieve my mind of a few things now sticking there.

As a division engineer on important eastern trunk lines I had more or less chances to form certain opinions as to whether or not a superintendent should be "boss" of his division. Now that I am not connected with a steam road my mind can be relieved without the fear of bringing about any feeling on the part of my superior officers. This should not have influenced me; nevertheless it did.

Having worked closely with about six superintendents of different characters I agree with the general manager when he says the managers are themselves to blame for letting organizations have certain concessions they are not in strict justice entitled to have. When a member of a train crew wilfully disobeys orders should not the superintendent have full say? Yes. Railway managers are very busy men and very often when cases are appealed to them they do not know the personal character of the disciplined party, nor are they told all the details. In this way the committee men are able to take advantage of the superintendent.

What should happen to an engineer when he wilfully passes a cautionary station block signal, and in daylight on straight track rams into the rear end of a train ahead? I know of such a case where nothing was done.

What should happen to an engineer pulling an officer's special who wilfully passes a signal denoting six miles an hour over a stretch of slow track, and runs at the speed of forty miles an hour? When this engineer made the next stop he wired the superintendent that his track was not safe for more than thirty miles per hour. After sending this wire he met me and told me of it. When I asked if he saw the cautionary signal, he answered, "Yes." When asked what speed it denoted, he replied, "Caution." When told the book of rules specifically stated six miles an hour, he denied it and laughed at me, replying, "You should have put out a bulletin to that effect." When this was reported to the superintendent nothing was done, as the men had the superintendent's "goat." However, a short time later, the superintendent being sick, I had to explain to the general superintendent, who promptly gave the gentleman ten days to read up his Bible.

Many an instance fully as grave in possible results could be given, and the discipline was nothing. Why? Because the superintendent was afraid the case would be appealed and reversed.

I have a great deal of respect for men in the road service, and say they deserve good wages; but my idea is that, as J. C. Stuart, vice-president of the Erie, recently stated, the Interstate Commerce Commission should sit up and take notice. The engineers recently advanced the statement that their duties were becoming more and more arduous, and brought more responsibility. However this may be, I fully believe it is very much overdrawn, as all safeguards for public protection also add to the safety of the engineer, and lessen his responsibility.

An engineer is on duty, on an average, ten hours per trip and not to exceed that per day on a road having heavy business, after which his responsibility ceases. For this he receives above $150 per month, and as much as $225. Isn't this pretty good pay for such responsibility? How about the trainmaster who puts in as high as fifteen to eighteen hours per day, whose responsibility *never* ceases and who is responsible for all road men? He seldom gets such a salary as $225. The same thing applies to all officers below the superintendent. Many and many is the month that I did not average five hours sleep per night, including Sundays, and I did not receive $200 per month, either.

For eighteen months on one road I was with I accepted a seven per cent. reduction in salary. Why? Organized labor was asked to accept—asked, mind you; I, as an officer, was ordered—either a 6 or a 10 per cent. reduction—I forget which—for three or four months until the road overcame a money stringency. Did organized labor accept? I guess not. The cost of living was too high. Still the poor trackmen, shopmen and others who earned from $35 to $75 per month got reduced, and it hit them hard.

With these facts in view it looks to me as if the engineers and some other employees should pull in their horns and let the poor fellows have a whack at the treasuries of the railroads. "Believe me," as the saying goes, whatever demands of organized labor are recognized compels retrenchment in some department, and almost always hits the maintenance and mechanical departments the hardest—the very departments on which the safety of the public depends the most.

In Mr. Lee's letter in your issue of October 18 he states that the master mechanic "ought to be fair and demand the imprisonment of officials who overlook reported repairs, purchase defective rails, use track and road bed too long before repairing." Surely, Mr. Lee should be too broad-minded to state that managers would wilfully buy defective rails. He knows better than that, or my opinion of him must be changed. On the other hand, imagine a piece of track being disturbed to such an extent as to require a 30 mile slow order. Then imagine a foolhardy engineer whose judgment (as stated in the investigation) led him to think the track was safe for 47 miles, thus leading to a bad derailment. He got 35 days, I believe. He should have been summarily dismissed, for it was no fault of his that fatalities did not result. An hour prior to the derailment in question another train passed this spot and noticed a very bad lurch at 20 miles an hour, but the engine crew failed to report it. The supervisor was summarily dismissed and the division engineer nearly "got his," too.

Mr. Lee states in this same letter, "This type of official is too common for the general good of the service" and "his going, like good whiskey, was necessary for the good of the men and the service." Egoism, thy name is Oragnized Labor! The hidden sarcasm in these sentences is like that too often directed against a division superintendent.

Whether I am right or wrong I say the division superintendent should be king of his division and that it would be a great blessing to railroads, and the public as well, if existing agreements with labor organizations were very liberally pared down; and as sure as I am a foot high this is bound to occur in the near future; and the public will do it, too.

A. SWARTZ,
Engr. M. of W., Toledo Railways and Light Co.

A FURTHER ADVANTAGE OF TERMINAL CHARGES.

New York, November 27, 1912.

To the Editor of the Railway Age Gazette:

In your honored journal, issue of October 25, you refer to the fact that the expensive terminals acquired by the railroads in the big cities should be followed by an extra rate or terminal charge to compensate the company for the extra expenditure. This extra charge, as you say, will be justified both on the basis of cost of service and value of service. There is, however, a broader aspect to the situation, to which I would like to direct the attention of railroad men, as well as of the public at large.

For nearly a century there has been a tendency on part of the population to drift to the cities. The age of steam which has been followed by the age of electricity, has accentuated this movement, as is evidenced by the census of 1910, in practically all the countries of the world. Manufacturers move to the cities because they are attracted by the labor market; by the fact that there is competition in transportation facilities, and in many cases the certainty of home markets for their products, etc.

In consequence thereof, the railroads in order to meet this condition, have acquired expensive terminals as nearly adjacent as possible to the manufacturing district of these cities. They have in many cases gone to a great expense to build sidings to various factories erected in the centers of these communities.

Unless something is done to check this movement towards the large cities, the railroads will have to increase these heavy expenditures. I do not presume you question the necessity of doubling the terminals every ten to twenty years in the various cities, like not only New York, Chicago, Philadelphia, etc., but also in the smaller sized manufacturing towns, like Newark, Paterson, Elizabeth, Trenton, N. J.; Wilmington, Del.; Chester, Pa.; South Bend, Ind.; Kalamazoo, Mich.; Rockford and Joliet, Ill.

What compensation will the railroads get for this increased capital expenditure for the increased cost of switching these cars over the multiplicity of sidings in order to reach their particular destination?

If the establishment of manufacturing plants were encouraged in the smaller communities, the local freight train in many cases could drop off one to five cars at some factory siding, located opposite the freight house or within one or two blocks of it, and the train could move on.

Compare cases of this kind of delivery with the delivery of cars on any of the local freight stations of important lines, or the site of a factory in the manufacturing district of Jersey City or Chicago. The difference in the cost of switching engines, as well as cost of real estate over which trains are run, etc., is, taking everything into consideration, from $3 per car upwards.

Supposing the little community was to get the benefit of this $3 per car. It would go a long ways towards overcoming the disadvantages of the smaller community compared with the larger one and its broad labor market, which now largely brings the factories to the big communities.

If a difference in rates can be established which is based both on cost of service and value of service, as previously stated, it would go a very long way not only towards avoiding car shortage, the congestion of terminals, but also the congestion of people in the large cities and thus help towards solving one of the biggest problems of our times. The consequences of such a change in the rate making fabric are so broad that space does not permit going into details.

There would be a great deal of opposition from the various chambers of commerce in the various cities, which are interested in building up their towns, the value of real estate and the business of their merchants. On the other hand, the small towns have no such organization. Should not a broad patriotic and philanthropic point of view prevail over a selfish one?

I do not wish to start out by suggesting that the rates to the smaller communities should be reduced; on the contrary, as suggested in your article, the shipper in the larger city should pay a terminal charge above the existing rate in order to compensate the companies for the more expensive service.

F. J. Lisman.

TENDER DERAILMENTS.

Chicago, Ill., November 26, 1912.

To the Editor of the Railway Age Gazette:

When a single wheel is rolled along an elastic track a depression is produced under the wheel which we call positive bending, as it places the base of the rail in tension. On either side of this point of contact there will be a point of inflexion where the direction of the curve changes and the rail head instead of the base is put in tension. This action is well known as the result of measurements made in the track. It may be taken as a general principle that the positive depression and the negative raising are proportional to the elasticity of the track

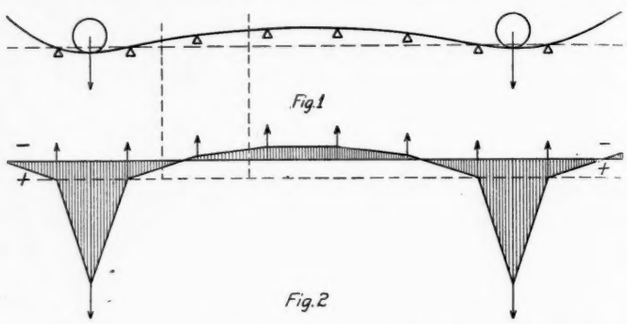


Fig. 1—Deflection Under Two Wheels of Equal Weight.
Fig. 2—Bending Moments in Rail Deflected as in Fig. 1.

and the weight of the rolling load. When we have two wheels of equal weight we will have the conditions shown in Fig. 1. This is intended to represent a continuous rail without joints. If there is a joint with poor powers of resistance the negative bending will be much greater. The reactions of the ties vary as a function of their distance from the wheel. The subject is a rather complicated one on which a number of books have been written. Some idea of the condition that exists may be obtained from Fig. 2, which shows graphically the bending moments under two wheels of equal weight. A mathematical analysis of the subject shows that the height to which the head will rise is proportional to the span, and it has been found in

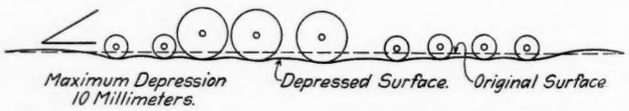


Fig. 3—Rail Depression as Ordinarily Found Under Engine and Tender.

Europe that the rail between tender and last driver rises nearly to its original position, even in comparatively rigid tracks. Fig. 3 shows the depression due to the engine and tender as ordinarily found.,

When for any reason the rail cannot withstand negative bending it is apparent that the rise between the last driver and the tender will be increased. There are a number of causes: Wear of head, reducing its section; break in continuity, such as that produced by the splice bar. This is found in new rail and joint fixtures, but gets worse as the joint is worn at the lower corners; excessive elasticity or looseness of the track due to loose spikes or insufficient tamping. In a recent case investigated the depression was between one and two inches; loose joints—not bolted tightly.

When a locomotive is accelerating rapidly the weight on the last driver is increased considerably above the normal. The

effect of this will be to produce the maximum upward deflection of the rail between it and the tender.

If the last driver of an engine is to the left and the forward tender wheel is to the right of a joint, there will be an upward tendency on the left of the joint due to the last driver, and a downward tendency on the right of the joint due to the front wheel of the tender. As soon as the tender wheel reaches the joint there will be a step up until the load is shifted to the left rail, which will immediately sink to its bearing in its loaded position. The remedy is to have splice bars so made and maintained that there is no play between parts and to have track of sufficient rigidity and weight to prevent maximum wave movements.

Also, any method of bringing the last driver and first tender wheel closer together will help matters. It would be of considerable advantage if the locomotive had a trailer loaded statically only to about one-half the amount of the driving wheels. Under the greatest acceleration then, the shifting of the load would not increase the pressure on this trailer to a value greater than that of the last driver as has been found in cases where it is loaded up to two-thirds of the load on the driver.

PAUL M. LA BACH.
Assistant Engineer, Chicago, Rock Island & Pacific.

CRITICISM OF CONTINGENT SCHEDULES.

SPOKANE, Wash., November 8, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

In your issue of November 1 the article entitled "Contingent Schedules on the Virginian Railway" was read with a great deal of interest not only by myself, but no doubt by all railroad men who are following the safety movement in train operation. Having handled trains for over twenty years as a despatcher and in other capacities, and having made a close study of train movement, I feel called on to offer my system of safety in train movement for criticism and for comparison with that of Virginian.

The Virginian contingents present some unique features which on a small road with close supervision would work out, but if tried out on a large system with dense traffic where train- and enginemen are constantly interchanging might result disastrously. Any rule coupled with exceptions applying one way today and another way tomorrow sooner or later causes trouble.

I cannot agree with the statement that a flagman has served no useful purpose unless he has actually stopped or warned a train which otherwise would have collided with the train he was protecting. I believe that all practical railway men will agree, in the face of the large number of rear-end collisions daily occurring, that (notwithstanding set rules, block, safety and automatic signals), the only safe way to protect a standing train is to have an intelligent flagman go back with danger signals.

To tell a flagman that under certain conditions when his train is stopped on main track he need not protect, then in the same breath tell him that under certain other conditions he must protect, encourages carelessness, and sooner or later finds the train without protection when in danger.

Let us look at the Virginian chart. Nos. 30 and 31 are scheduled to meet between F and G. Suppose these trains were notified of each other and no meeting point provided by the despatcher. We should have one at F and one at G, waiting for each other, as neither has superiority. Then again, No. 31 is two hours late and No. 3 one hour late. Despatcher puts out order to 31 at C to 30 at H to meet at D; and No. 31 fails to receive the order. Both trains being late, what prevents a collision between C and G?

Suppose it were desirable to move the wrecker or an unexpected special train immediately—the Virginian rules say "No following extra can be run until the next schedule, unless the train despatcher has given notice to all contingent schedule trains and third class trains in the same direction; this because of there being no flag protection for preceding extras. Under these conditions the wrecker or special would meet with serious delays and especially so in case of wire interruption.

The principal causes of misunderstandings arising in train movement are due to (1) complex time tables on which are shown two, three or more classes of trains with train rights, and (2) the indiscriminate running of extras in both directions. We all know that time table freight trains seldom leave the terminals on schedule time, and invariably are so late that the train despatcher issues numerous "run lates," "waits," "right over" and "annulment" orders and then finally starts some of the delayed trains as extras, giving them "splash meets" with opposing extras, which at the time he issues the order he knows will not hold good; but he feels that the train must be moved. As a result on a heavy division the despatcher has made himself so busy he can not do justice to his trains. The trains on the line are overtaxed and puzzled with numerous restricting orders and at the same time are working against delayed superior time table trains of two or three classes. It is these conditions which cause trouble and retard train movement. My proposed system anticipates and reduces the possibility of such conditions to the lowest minimum by introducing a time table with but one class, namely, first class trains with time table rights and authorizing the issuing of speed schedules when necessary to move traffic. All these schedules are based on the same terminal figures daily. The Virginian schedules admit of use only at certain times, and they are of one speed, while mine permits the starting of a train at any time at several different speeds.

Like the standard code, my scheme demands that Rule 99 be strictly complied with, and when a train is being delayed or stopped its flagman must go back immediately. The train despatcher has no delayed second, third or fourth class trains to take up his time, and he has ample time to closely supervise his extra trains.

Train- and enginemen have but a simple one class time table to check against, and plain printed schedules, when authorized, that are based on the same figures every day; and much fewer train orders than either the standard or the Virginian.

I have handled extra passenger, stock, fruit and other freight trains on special schedules on the 'Frisco, the Santa Fe, the Great Northern and other lines. I believe train despatchers generally will admit that this is the logical method to secure good movement. The only drawback at present to its general use is the complex time tables with several classes of trains and the time it requires to put out a special schedule.

All of these objections are overcome by my proposed schedules and time table. Trains will make their own meeting points, generally speaking, and the train-order positive meets will be the exception to be used only to prevent bunching or sawing, or in case of accident or serious delay. G. W. TURNER.

[Mr. Turner's system is described on another page.]

A PROMINENT SIGNAL ENGINEER ON COLLISIONS.

——, ——, November 14, 1912.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

I have read with great interest the editorials in recent issues of the *Railway Age Gazette* on the subjects of railway accidents, the investigations by commissions, and automatic stops. And I submit some thoughts of my own on these subjects, particularly the last named, covering points which you have failed to mention, though I believe the views you have expressed are entirely conservative and correct.

From our knowledge of the workings of automatic devices and their liability to failure it is reasonable to conclude that the railways which have had automatic stops in use for any length of time have had things happen which if published would tend to make their further use a questionable procedure. For various reasons nothing is said about these occurrences, and the consequence is that the public, the railroad commissions and a great many railroad officers are looking forward confidently to the development of a satisfactory automatic stop.

Years ago we started to protect trains by means of manual block signals. I do not believe the greatest enemy of the manual block system can say that its record has been bad. It is better today than it was at the start, purely on account of the increase

in the care and attention with which its operation is surrounded. At the start, however, there were many accidents which it did not prevent, and it was only natural that efforts should be made to design something to take its place. The result of these efforts was the automatic signal, which, when it was first installed, was not very satisfactory, and yet nothing was said about its failures. Luckily no serious collisions occurred during the first few years of the automatic signal's existence [because of signal failures]; and it was rapidly improved, and finally came to be looked upon as the corrective measure for the few accidents which occurred under the manual block system. A large mileage of automatic signals is in use at the present time. It is a matter of record that the accidents [collisions] recorded under this type of protection are more numerous than those recorded against the manual block system, and yet commissions and the public still look to the automatic block system as the greatest development of the art. Probably if they knew of the almost unpreventable failures which sometimes occur to automatic signals, and which, were it not for the law of chance, would bring about destructive wrecks, they would question the necessity for displacing manual block by automatic signals.

I mention the law of chance in connection with automatic block signals, because it is not nearly so big a factor in the manual block system. Nearly every breach of rules in the latter results in a disaster, because there are two trains involved. A similar failure in either the men or the apparatus may occur in connection with automatic signals and only one train be involved, so that circumstances may be such that no accident [collision] will occur. As a matter of fact, a large percentage of failures by the men or the apparatus in automatic block territory is of this kind, which reduces the number of disastrous failures. Again, even if two trains should be involved, it might occur—in fact it is almost the exception when it does not occur—that the train which has not been protected reaches the zone of another signal that is working properly or that is noticed by the engineman on the following train, and thus is protected. This still further reduces the proportion of disasters due to automatic signal failures; and shows how the law of chance operates to correct the failures occurring with this type of signal. The installation and maintenance of automatic signals is having very grave consideration, and it is very probably true that the same earnest attention is being paid to the safe operation of trains under this form of protection as has been given to manual block. So that it is only a question of economy whether manual block or automatic signals are used.

But wrecks happen in spite of all this. Instead of getting back to the basic cause, however, the tendency is to introduce still another so-called safeguard—the automatic stop. There is no question but that this form of protection is very attractive. Unanalyzed the proposition appears to be that the automatic stop will remove the human element from train operation to such an extent as to prevent disasters from dereliction of the human element. But what about the human mind that is engaged in designing, manufacturing, selling, and in purchasing, installing, and maintaining devices of this kind?

Automatic stops will be installed, however. The tendency is strong in that direction. But a grave necessity exists for such an analysis of the entire situation with respect to such devices as will make evident the facts in the case. The public, the railroad commissions, and a large number of railway officers whose minds are not yet made up, or who are predisposed in favor of these devices should be informed as to their true nature, and should be told about not only the successful operation of some of the stops and the accidents they have prevented, but also the character of these devices, their inherent liability to failure, the possible accidents that might have resulted from these failures, and the true results that may be expected from their use, not on some short part of a given road, but on the large railway mileage which is included within the United States.

I do not believe that anyone, even an inventor, can see the ultimate solution of the safety problem in automatic stops, even insofar as the accidents they are particularly calculated to prevent are concerned. Their use will not add anything to the facilities provided for the safe handling of trains. The particular control they are designed to effect is already provided. The resultant advantage can only be a check against disobedience, and their use is simply putting off the good day when all will have to realize that the safe operation of trains depends entirely upon the quality of the discipline insisted on. It is putting off the day when railway employees must come to a realization that the public is holding them responsible for obedience to the rules and regulations which are laid down by the railways. When this day comes we shall operate our trains safely without check under any system that is based upon correct principles, whether it is the order system, the manual block system or the automatic block system. Until this day comes we shall continue to have disastrous wrecks, no matter what type of protection we use.

As to block signaling, any fairly well designed scheme is safe. While distant signals might have assisted the engineman somewhat in the case of the wreck at Western Springs on the Burlington, still they bear no relation whatever to the results obtained. The main fact in that disaster was that a man did not stop at a signal indicating stop. The fact that certain members of the crew did not assist in the matter was, of course, a contributing cause, but nothing more; and the mere fact that a flagman made an effort to prevent the engineman from disobeying instructions seems to be a matter of congratulation, even if the flagman did not accomplish all that he tried to accomplish.

With respect to distant signals, we had an earnest discussion recently as to the desirability of the use of these signals in connection with manual block signals used as train order signals. The committee which made the final disposition of the matter was composed of general superintendents and the signal engineer—not an irresponsible body, you will acknowledge. The final ruling was that the use of distant signals in connection with any signals which were employed as order boards was inadvisable. The reason for this ruling was that it might be necessary to stop a train at any time up to the instant when the engineman had actually passed the order board. It was held that the introduction of distant signals would tend to give him more confidence in the probable position of the home signal than it was desirable that he should have.

Many operating men feel as this committee felt; and their desire not to install distant signals is prompted only by this vital consideration of the necessity of stopping trains at a stop signal at any time before that signal is reached regardless of the fact that some other signal may have previously been cleared.

The following illustration will help to make clear the probable result of substituting mechanical checks for human care. A certain interlocking plant was installed for the protection of a lap siding, and probably every known check on the operation of this plant was provided. Nevertheless, in spite of this precaution a switch was thrown under a train. No very great damage was done, as the train was moving slowly. It could not be proved that there was a failure, because everything was found in perfect working order immediately after the occurrence, but it is very probable that something failed. The switch that was improperly operated was situated right outside the window of the interlocking station. The operator had to face this window in order to operate his machine, and he had a good view up and down the track in both directions. If he had used ordinary care and had not relied absolutely on the mechanical checks in the operation of his machine he would certainly have seen a train which was directly in front of him, and would not have deliberately operated a switch over which that train was passing.

In these two illustrations I have tried to make clear the fact that the objections that some railroad men have to automatic stops, the installing of distant signals, and more than a reasonable number of mechanical safeguards, are based on some real reasoning, and have back of them some highly instructive and conclusive experience. They are not the result of penuriousness.

SIGNAL ENGINEER.

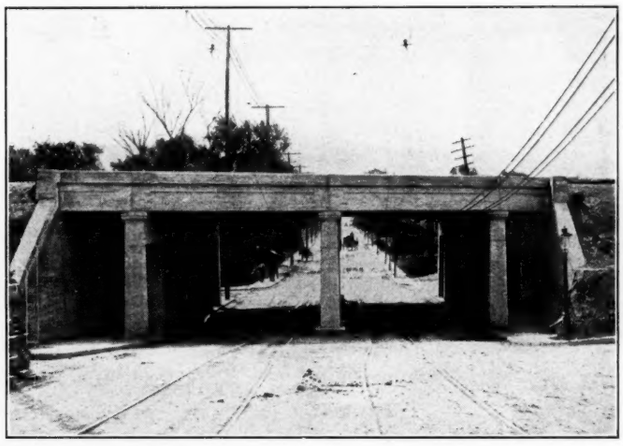
UNIT SYSTEM OF SUBWAY CONSTRUCTION.

The Kansas City Terminal Is Building Concrete Bridge Columns in a Slab Yard, as well as Deck Slabs and Cross Girders.

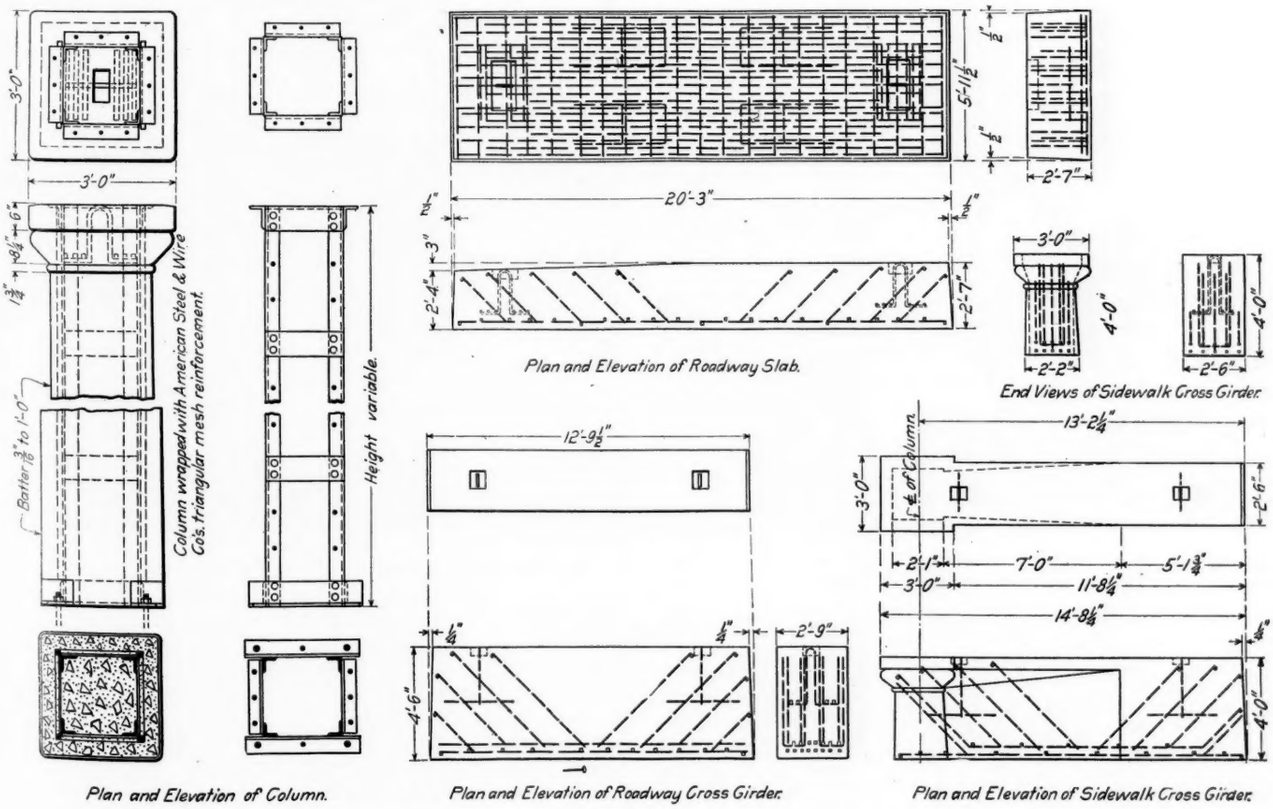
By A. R. Eitzen,
Office Engineer, Bridge Department, Kansas City Terminal Railway.

A few years ago the Chicago, Burlington & Quincy began building concrete subway decks in units in a slab yard. When the sub-structure was completed, these units were taken from the slab yard and set in place in the deck with a derrick. Later the Illinois Central and the Chicago, Milwaukee & St. Paul also did a good deal of this work. Still later the Chicago, Burlington & Quincy built cross girders in the same manner in a subway at Clyde, Ill., the columns being built in place as before. In the construction work that the Kansas City Terminal is doing, not only are the slabs and cross girders built in the slab yard, but the columns as well. Where a number of structures are to be erected in one locality this unit system is of advantage, for a yard can be built at a convenient point—in this case in close proximity to a rock quarry—and a concreting plant can be built which will handle the material economically. The units can be cast on the ground, doing away with expensive form and false-

Placing a Column.



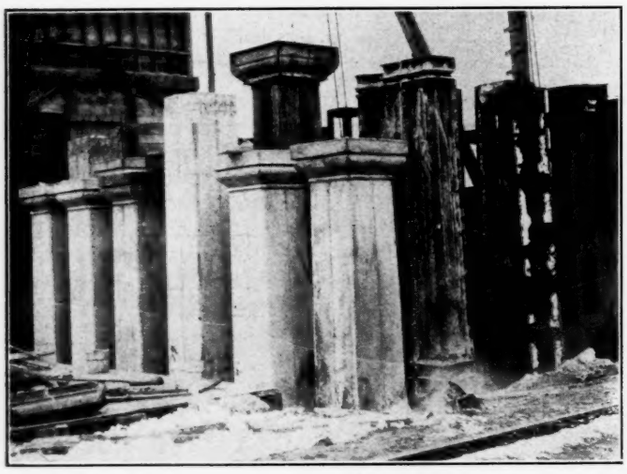
Completed Subway Built by Unit System.



Details of Columns and Cross Girders in Unit Subway Construction on the Kansas City Terminal Railway.

work, and the forms and platforms can be used again and again without change. In addition, the deck can be cast and cured while grading and excavation are going on, thus lessening the time of erection of the structure.

The units for the various structures of the Kansas City Terminal are being made in accordance with the plans shown herewith, and all are provided with lifting stirrups, making the erection very simple. The columns are handled by a hook



Subway Columns, Forms and Reinforcement.

Arrangement of Slab Forms in Casting Yard.

alone, from a derrick, while cross girders and deck slabs are lifted with toggle frames with the same machine.

A number of interesting points have arisen in regard to the design of these structures. The first question asked when unit columns were suggested was, "What anchorage will be required?" Upon investigation, it was found that the dead load of the structure was so great in comparison with the horizontal forces acting, except temperature stresses, that no anchorage was needed. However, four 1-in. bolts were used, one at each corner, which were set in place when the footings were poured. In casting the columns a recess was left at each lower corner

Placing a Cross Girder.

General View of Slab Storage Yard.

extending to the column baskets to allow room for bolting the columns to the footings.

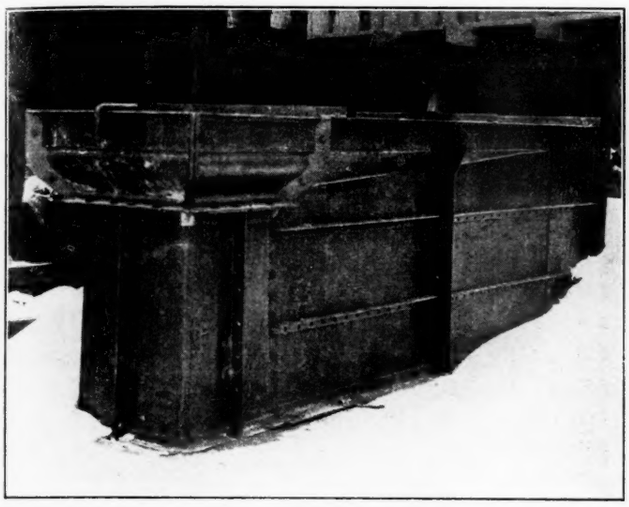
Two types of columns have been cast, those with and those without capitals. The end columns are without capitals, and are surmounted with end cross girders, one end of which has the same form as the column capital, giving the effect of columns extending from the pavement to the deck slabs. In casting the columns, the forms were set on end and filled to the base of the capital. The concrete was then allowed to settle before the capital was poured, to prevent the capital from cracking away due to shrinkage of the concrete.

The next point taken up was the stress in the columns due to the expansion or contraction of the deck with changes of temperature. The force necessary to hold the structure from expanding was found to be very much greater than the friction between the deck and cross girders, or between the cross girders and columns, so that the deck would slide or the columns bend. The frictional force was found to be much greater than the force required to bend the column the amount due to expansion. As the column was comparatively very short, it was impossible to make it strong enough, assuming it fixed at the ends, to withstand the deflection. It was therefore assumed that, as the change in temperature was necessarily slow, the column footings would adjust themselves, so no allowance was made in the columns for bending stresses. Wherever possible the columns will be supported on caissons carried to limestone or shale, and where this is not possible spread footings will be used. Lift stirrup pockets in the columns and cross girders were filled with sand mastic, and the joints were all filled with grout. The top surface of the slabs was dressed smooth to take the waterproofing. This waterproofing will be applied in much the same manner as previous work of the same character on other roads has been done.

Mention has been made of the end columns of the subways. Whether they should be the same length as the intermediate ones in order to show that the cross girders were supported on them and the deck slabs on the cross girders, or whether it was

best to show the facia slabs directly supported on the columns with the cross girders apparently built in, was a much discussed point in the design. Wooden models were built in both ways, the latter giving the subway an appearance of greater height, although otherwise little difference was noted. Both types are being used.

The cross girders are very short and deep, so that shear rather than moment governed in the design. The section was



Steel Form for End Cross Girder.

made such that the allowable value of 120 lbs., where used as a measure of diagonal tension, was not exceeded. The total number of units to be cast at the slab yard will be about 1,460, giving a yardage of approximately 10,000 yards for 13 structures.

All this work was designed under the direction of George E. Tebbetts, bridge engineer, under the supervision of J. V. Hanna, chief engineer.

ANOTHER CONTINGENT SCHEDULE SCHEME.

G. W. Turner, of Spokane, Wash., sends us the following description of a "safety" plan devised by him for simplifying the movement of freight trains on single track; and in a letter, printed on a preceding page, he presents some arguments to support his claims. We understand that this scheme is looked upon with favor by prominent Western railroad officers.

Under the proposed system extra trains do not require, as at present, orders to "run extra" from one point to another. For this reason Form G is entirely eliminated, and such definitions and rules pertaining to extra trains, as are found in the standard code, are modified and changed to conform to the new system.

To obtain the best results, the regular employees' time table should show nothing but first class, mail, express or passenger trains with time table rights. Objections may be raised to this on the ground that in case of wire trouble freight traffic would be tied up. On the contrary, under the proposed system, it is possible to move traffic in one direction at any time, under certain restrictions, regardless of interrupted communication which is impossible under present methods.

Having issued a time table showing nothing but first class or passenger trains with time table rights, there are to be shown on a page adjoining each district, or, if found more convenient, in the back of the time table, speed schedules covering each district and made up in both directions. These should be printed in the style shown at the end of this article.

To suit the conditions of different lines, as many rates of speed per hour may be used as is found necessary. Each rate of speed should be shown in two columns, thus giving an a. m. and a p. m. schedule for each rate of speed from the initial point.

In some cases, owing to grades or track conditions, it may be thought necessary to make the schedule slower between certain points; but as a general proposition it is preferable to show the same rate of speed throughout, as a slight loss of time from one station to another will adjust itself on the run, and track conditions can be governed by slow boards or special orders.

All busy lines have a preferred direction for the movement of traffic. To illustrate the workings of the proposed system, we will say that the preferred direction on the line shown in the illustration is Farley to Pablo, or westbound. Train despatchers should only issue or authorize speed schedules in the preferred direction, except in cases of emergency, such as the movement of the wrecker in the opposite direction.

The issuance of orders covering speed schedules is governed by the following few simple rules. Extra trains, except work extras, may occupy the main track or run from one point to another point only when authorized by the initial point clearance cards for extras, form I. P. C. Extra trains receiving clearance cards, form I. P. C., will be governed by the current time table, rules and instructions in effect and such numbered train orders and special instructions as may appear on the clearance card. If no train orders are in force affecting the movement of an extra train when it is ready to start from its initial point, clearance card, form I. P. C., will be its authority to proceed, governing itself by time table, rules and regulations in effect.

Clearance cards, form I. P. C., will be issued consecutively beginning with number one at midnight, and will be completed with time, and superintendent's signature, the same as a train order. Speed schedules will be issued in the following forms:

Example 1. Engine 500 run on schedule B Farley to Pablo with right over eastbound extras.

Example 2. Engine 500 run on schedule B three (3) hours late Farley to Pablo with right over all trains except No. 1.

Example 3. Engine 500 run on schedule A two (2) hours late Bedford Junction to Pablo with right over all except first class trains.

As many trains may be run on the same speed schedule as conditions may require, and all trains will be governed strictly by the numbered train orders relating thereto. In case it may be necessary to annul a train running on a speed schedule the following form will be used:

Example. Engine 500 running on schedule B is annulled from Marshall.

To further illustrate, let us suppose that extra 300 is called to leave Pablo eastbound at 11:00 a. m. Engines 400, 500, 600, 700 and 800 are running westbound on speed schedules, under the following orders, which, in accordance with the standard code, would be issued to all opposing trains at Pablo and intermediate points:

Order 5. Engine 400 run on schedule A eight (8) hours late Farley to Pablo, with right over all trains.

Order 8. Engine 500 run on schedule PB Farley to Pablo with right over eastbound extras.

Order 15. Engine 600 run on schedule PB two (2) hours late Farley to Pablo with right over eastbound extras.

Order 16. Engine 700 run on schedule PD one (1) hour late Farley to Pablo with right over eastbound extras.

Order 24. Engine 800 run on schedule PF three (3) hours late Bedford Junction to Pablo with right over eastbound extras.

At 11:00 a. m., or when ready to start, extra 300 at Pablo signs for orders 5, 8, 15, 16 and 24; receives clearance card, form I. P. C., together with copies of these orders, and proceeds under the current time table, rules and regulations in effect, and governed by the speed schedules mentioned in orders 5, 8, 15, 16, 24.

All speed schedules are based on the same leaving time from initial points, which makes it a very simple matter to check up schedule orders. Thus, engine 400, running on schedule A, eight hours late, is due out of Farley at 10:00 a. m. and at Pablo at 11:51 a. m. Engine 500, running on schedule PB, with

no exceptions, is on the time shown in the printed schedules, and is due out of Farley at 2:00 p. m. and at Pablo at 4:35 p. m.

Engine 600, running on schedule PB, two hours late, is due out of Farley at 4:00 p. m. and at Pablo at 6:35 p. m.

Engine 700, running on schedule PD, one hour late, is due out of Farley at 3:00 p. m. and at Pablo at 8:38 p. m.

Engine 800, running on schedule PF, three hours late, is due out of Bedford Junction at 9:20 p. m. and at Pablo at 12:24 a. m.

Under the proposed system engine 300 has nothing on the time table to look out for but first class trains, and is governed by the schedule orders it has signed for and received.

Under the present system of train movement, time table freight trains from one cause or another are invariably late leaving the initial point, which results in the issuance of numerous, and often times many unintelligent, run-late orders; the indiscriminate running of extras in both directions, with positive meeting points, dividing the responsibility of proper execution of the orders between the two opposing crews, the operator, and the train despatcher, with a possibility of one or the other overlooking an extra or a meeting point.

Under the proposed system, the issuance of running orders to extras in both directions, and reconciled with a positive meeting point is done away with, and train- and enginemen have a very simple time table to check against, on which nothing but first class trains appear. They have no late freight trains with time table rights to fear, but, on the other hand, have opposing freight trains on a practically on-time schedule at all times.

Much trouble has in the past, and is at present being experienced with Form F, of the standard code, and numerous accidents are occurring by reason of trains failing to observe signals displayed for a following section, trains ordered to display signals failing to do so, or conductors failing to properly register signals displayed by their trains. If so desired Form F can be set aside, and instead of running sections displaying signals, the train, or trains, can be put on one of these speed schedules at a moment's notice, and given any rights desired, or an unexpected special train can be handled very quickly without taking the time to get out a special schedule as at present.

In addition to the speed schedules being printed in the time tables, they can be issued in book form, convenient pocket size, to be carried by train- and enginemen. The figures never change, no matter how many times the time tables are issued; the speed schedules are always the same, and the men will be as familiar with them as they are with a time table that has been long in force.

Another thing, should wires fail, or communication be interrupted, freight traffic is not tied up waiting for an open schedule as at present. On the other hand, under certain restrictions, it is possible to move as many trains in one direction as is desired, at any time, regardless of the interruption.

The same or a greater number of trains can be handled under this system with less than half the number of orders now required under the present methods; quicker and safer movement can be had, and the likelihood of collision through some one blundering is reduced to the lowest possible minimum.

With the exception of eliminating Form G (and Form F if desired) the changing of a few minor rules and definitions relating to extra trains, the proposed system is nothing more than a better and more progressive application of the present methods of handling trains by special train orders. The men have nothing new to learn, or to be drilled in, and will adapt themselves at once to this simplified method of train movement. A fair trial will convince the most skeptical of its merits.

Below is a transcript of a part of Mr. Turner's table of speed schedules. On the westbound side, from Farley to Pablo, the reader sees the two schedules for 60 miles an hour, and one of the two for 45 miles an hour. Reading farther to the left he would see schedules for 30 miles an hour, for 20, for 15 and for 10, all of them arranged to leave Farley either at 2 a. m. or 2 p. m. The alphabetical arrangement is A, B, C, D, F, G, with the letter P added in each case for the afternoon schedule. On the eastbound side the schedules are arranged in the same way and lettered H, J, K, M, N, Q, with the letter P added in each case for the schedules starting in the afternoon. The subhead of this table of schedules reads "Speed schedules not in effect unless authorized by special train order."

Part of a Table of Turner's Safety Speed Schedules.
Farley to Pablo.

45 m.p.h. B lv. a.m.	60 m.p.h. PA lv. p.m.	60 m.p.h. A lv. a.m.	Dist.	Time Table No. 30.	Dist.	60 m.p.h. H arri. a.m.	60 m.p.h. PH arri. p.m.
2 00	2 00	2 00	0	..... Farley	111	5 51	5 51
				4			
2 06	2 04	2 04	4	..... Horan	107	5 47	5 47
				3			
2 10	2 07	2 07	7	..... Moore	104	5 44	5 44
				3			
2 15	2 10	2 10	10	..... Milan	101	5 41	5 41
				5			
2 22	2 15	2 15	15	..... Hart	96	5 36	5 36
				4			
2 27	2 19	2 19	19	..... Coleman	92	5 32	5 32
				2			
2 30	2 21	2 21	21	..... Bend	90	5 30	5 30
				5			
2 37	2 26	2 26	26	..... Marshall	85	5 25	5 25
				4			
2 43	2 30	2 30	30	..... Madras	81	5 21	5 21
				3			
2 48	2 33	2 33	33	..... Mecca	78	5 18	5 18
				6			
2 56	2 39	2 39	39	..... Thomas	72	5 12	5 12
				4			
3 01	2 43	2 43	43	..... Niles	68	5 08	5 08
				3			
3 05	2 46	2 46	46	..... Marengo	65	5 05	5 05
				5			
3 11	2 51	2 51	51	..... Lipton	60	5 00	5 00
				2			
3 15	2 53	2 53	53	..... Wiley	58	4 58	4 58
				3			
3 20	2 56	2 56	56	..... Dedham	55	4 55	4 55
				4			
3 25	3 00	3 00	60	..... Exeter	51	4 51	4 51
				3			
3 29	3 03	3 03	63	..... Chareton	48	4 48	4 48
				2			
3 32	3 05	3 05	65	..... Bedford Jct.	46	4 46	4 46
				3			
3 36	3 08	3 08	68	..... Cooks	43	4 43	4 43
				4			
3 41	3 12	3 12	72	..... Hill Top	39	4 39	4 39
				3			
3 45	3 15	3 15	75	..... Halls	36	4 36	4 36
				5			
3 52	3 20	3 20	80	..... Americus	31	4 31	4 31
				4			
3 58	3 24	3 24	84	..... Quincy	27	4 27	4 27
				5			
4 05	3 29	3 29	89	..... Holland	22	4 22	4 22
				3			
4 09	3 32	3 32	92	..... Steele	19	4 19	4 19
				2			
4 12	3 34	3 34	94	..... Rawlins	17	4 17	4 17
				3			
4 15	3 37	3 37	97	..... Page Jct.	14	4 14	4 14
				4			
4 21	3 41	3 41	101	..... Lester	10	4 10	4 10
				3			
4 25	3 44	3 44	104	..... Stiles	7	4 07	4 07
				4			
4 30	3 48	3 48	108	..... Wilson	3	4 03	4 03
				3			
4 35 a.m. arri.	3 51 p.m. arri.	3 51 a.m. arri.	111	..... Pablo	0	4 00 a.m. lv.	4 00 p.m. lv.

Railway Mileage in Guatemala.—The length of the railways in Guatemala at the close of 1911 was 420 miles. During that year the railways of that country carried 1,187,433 passengers and 252,882 tons of freight, of which 149,433 tons represented local freight; and 103,449 tons, the freight made up of import and export.

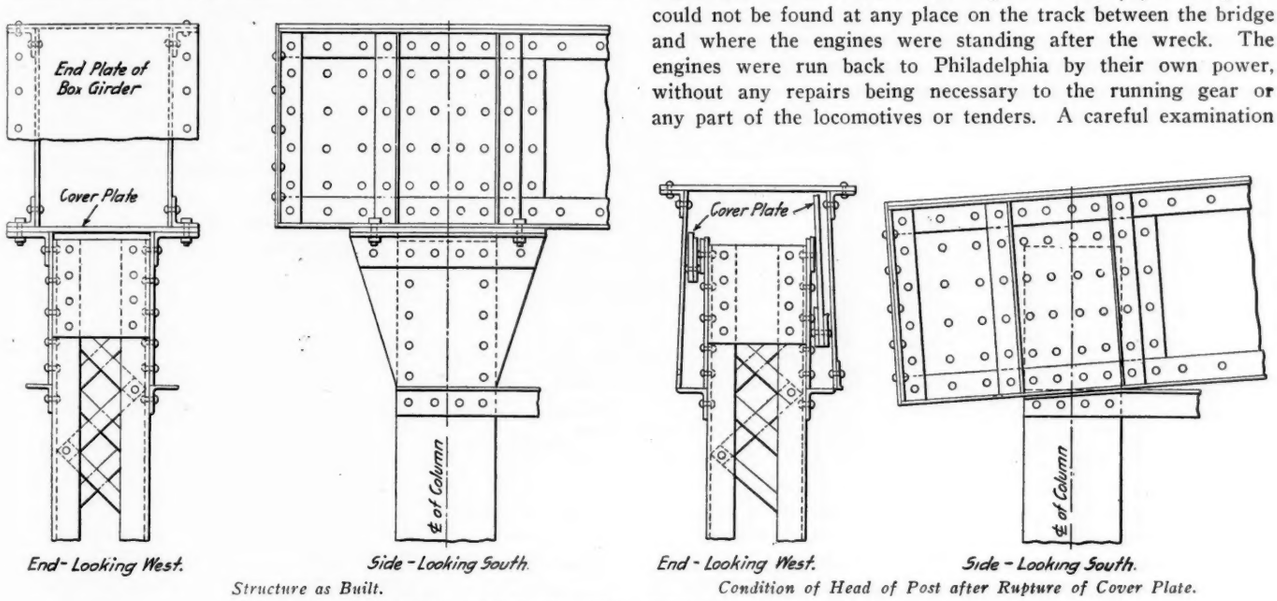
Switzerland's New Outlet.—The opening of the Loetschberg tunnel, which is over nine miles long, establishes a new and important traffic outlet for Switzerland. It shortens the distance between London and Milan and other points in northern Italy by several hours, and when completed and equipped with electric motive power according to the plans, will prove an important branch of the transportation system of Switzerland.

CAUSE OF THE GLEN LOCH DERAILMENT.

Remarkable Failure of a Latticed Bridge Column from an Obscure Cause, and Possibly an Obstruction on the Track.

The derailment of passenger train No. 19, of the Pennsylvania Railroad at Glen Loch, Pa., November 27, was reported in the *Railway Age Gazette* of December 6, page 1086. The cause of the depression of the track on the bridge, apparently the most probable cause of the derailment, was the failure of the support of the bridge, as shown in one of the illustrations on page 1087. We reproduce herewith a drawing, received from the railroad company, showing the construction of this bridge support and the appearance of the parts after the accident. With this drawing we have received a copy of the report made to the general manager of the road by a special committee, including the testimony of the trainmen and witnesses; diagrams of the tracks, a plan of the bridge, copies of the reports of the inspectors of the bridge and of the locomotives, and of the engineers who made physical and chemical tests of the faulty metal after the accident, the latter including photographers.

The report is signed by G. W. Creighton, general superintendent of the Eastern Pennsylvania division, chairman; H. C. Bixler, assistant superintendent of the Philadelphia Terminal division; J. R. Alexander, general road foreman of engines; J. P. Yergy, general car inspector; J. M. Henry, master mechanic, and J. W. Stone, acting division engineer. Following is a summary of the report, omitting facts which were given in our previous account.



Structure as Built. *Condition of Head of Post after Rupture of Cover Plate.*

Details of Post No. 8 Bridge No. 43½, Pennsylvania Railroad, Glen Loch, Pa.

The train received the usual and the proper inspection at Philadelphia, about 40 minutes before the accident. The two engines drawing the train weighed 183,100 lbs. each; the tenders, 132,500 each; the first three cars from 58 to 63 tons each, and the sleeping cars about 79 tons each. The train was on track No. 4, the northernmost track; it approached the bridge at about 48 miles an hour on a slightly descending grade, with steam shut off. The first engine broke loose from the second, and the second broke loose from the first car; the first engine ran about 2,000 ft. beyond the bridge, and the second about 1,800 ft., only a part of their wheels being off the track. The weather was clear; temperature 34. The last train preceding No. 19 was a long train of empty freight cars moving at about 20 miles an hour. The engineman, fireman and a brakeman riding on the second engine of this freight train noticed a jolt or jar as they passed over the bridge; but no other person on the train noticed anything of the kind. Another freight train passed in the same direction on the adjacent track just before this. Two flagmen guarding the rear ends of these freights, which had been stopped west of the bridge, stood a short distance west of it and watched the approach of the passenger train; and both of them say that just before No. 19 reached the east end of the bridge they noticed considerable fire flying from under the first engine. This testimony concerning the fire and that of the men on the freight engine, above mentioned, constitute the only evidence of any possible cause for the derailment other than the failure of the bridge support, except perhaps, the marks on the rail east of the sunken girder. The men on the passenger engines describe the first shock as a marked sinking; the engine seeming to rise immediately after. No trespassers were noticed in the vicinity, and a track watchman had been over the bridge only 20 minutes before the accident. Nothing about the engines or cars of the passenger train showed evidence of anything wrong which would have caused the derailment; but the coupler at the rear end of the tender of the second engine was entirely missing and could not be found at any place on the track between the bridge and where the engines were standing after the wreck. The engines were run back to Philadelphia by their own power, without any repairs being necessary to the running gear or any part of the locomotives or tenders. A careful examination was made for defects in the engines of other trains which had passed over this bridge on this track immediately ahead of the passenger train.

The bridge, which is designated as No. 43½, is of iron, and was built by Coffrode & Saylor in 1890. The track on the bridge curves 2 deg. to the left, going west. The tracks of the Trenton branch, beneath the main line, lie at an acute angle to the main line, about 15 deg. The superelevation of the outer rail of the westbound track on the bridge is 3 in.

"The center pier, where the failure occurred, is composed of a stone wall or pier, about five feet high above the level of the Trenton Branch rails, upon which there are eight iron latticed posts 12 in. square, composed of two 12 in. channels, joined together with latticed bracing, the tops of the posts being enlarged to 24 x 24 in., in the form of a cover plate, resting upon the top of the column and supported longitudinally in the direction of the center pier by gusset plates on either side of the column, the top length of the gusset plates being 24 in., the height of the plates being 18 in., and the bottom of the gusset being the width of column, namely, 12 in. In addition, the outer edges of the cover plates are supported by 4 in. x 6 in.

angles riveted to the same and to the upper edge of the gusset plates and column channels. Upon the top of these eight columns rests a box built girder. This is 17 in. wide and 24 in. high. Its web plates are attached to a top cover plate 24 in. wide, by a suitable angle. The bottoms of the web plates are stiffened by angle irons, and where the girder rests upon the cover plate, at the head of the post, it is held in position by four bolts which pass through the lower angles and the cover plate of the post. The bottom edges of the web plates are held in position by lattice bracing. The main girders of the bridge are supported upon the stone abutments and their abutting ends in the center are held in position on the top of the box girder by two bolts in the end of each of the main girders passing through the top cover plate of the box girders.

"The floor of the bridge, supporting the tracks, is composed of I-beams riveted to the main girders above the lower flange and supported at the center pier on the top of the box girder, which rests upon the latticed iron columns. On top of the floor beams the track structure is composed of wooden stringers, lengthwise under the rails, properly dapped over the floor beams, the cross ties being laid directly upon the wooden stringers, and the rails spiked to the same.

"The standard regulations require all bridges to be inspected monthly by the bridge inspector for detail defects, semi-annually by the division engineer and master carpenter, and annually a special deflection test is required to be made by the bridge inspector.

"Bridge No. 43½, in accordance with these regulations, was inspected in detail November 18, by the bridge inspector, at which time nothing unusual was observed, every part being reported as 'good,' except the back walls of the abutments, which were reported as 'fair,' which comment had reference to slight displacment of several stones, due to the wedging effect of the ballast on the 'land side,' which in no wise affected the integrity or safety of the structure.

The semi-annual inspection by the division engineer and master carpenter was made October 7, which inspection disclosed no imperfection affecting the integrity or safety of the bridge. The annual deflection was made on November 26, one day before the wreck, and this test developed no conditions that would indicate weakness in the structure.

"The two tracks on either side of the bridge are well ballasted with trap rock. The ties, spaced 18 to each 33 ft. of track, are practically all white oak, each with 8 in. or more face. All ties are tieplated with shoulder tie plates and are in first class condition, the 1912 renewals having been completed and the track put in good shape for the winter. The rail on No. 4 track is P. S. open hearth, 100 lb. section, manufactured by the Pennsylvania Steel Company, and was laid new on June 9, 1910. The splices are six-hole Bonzano dependent flange type, manufactured by the Pennsylvania Steel Company. The line and surface of No. 4 track on the bridge and on either side was in first class condition at the time of the accident.

"The track on bridge No. 43½ and on either side of it is inspected once daily by the track foreman, and twice each day by track walker, and twice each night by the night track walker, the latter being checked by a watchman's clock. The track foreman and both track walkers testify that their inspections on the day of the accident revealed no defects, the night track walker stating that he had spent about twenty minutes examining the bridge and tracks shortly after 10 p. m., or about one and one-half hours prior to the accident.

"Immediately after the wreck an inspection disclosed a mark or thread line on top of the north rail, beginning at a point 8.3 ft. east of post No. 8 [the post that failed], then continuing westward for a distance of 6.1 ft., where it left the rail to the north side. Further on and about 4 ft. east of post No. 8 there were marks on the crossties of the flanges of wheels, north of the outer rail and between the inner main rail and the inner guard rail.

"The end of the box girder over the top of post No. 8 was depressed about eighteen (18) inches, due to the rupture of the cover plate at the top of this post. Beyond this point there were numerous marks of derailed wheels.

"A laboratory test was made of the ruptured cover plate. This indicates that the plate would have passed the requirements of strength and elongation of the ordinary bridge specifications, as well as of the specifications of merchant bar iron of the Pennsylvania Railroad. The plate was placed in position on the top of the column with the fiber longitudinally in the direction of the bridge.

"The design of the structure prevented the disclosure of the rupture of the cover plate under the usual inspection, except at the front and rear ends of the plate where the accumulation of paint would have a tendency to obscure the same. This detail fracture had no observable effect upon the stability or strength of the structure as is evidenced by the satisfactory results of the deflection test made the day before the wreck occurred. This test was made with the bridge under load of passing trains, and did not disclose any weakness in the structure.

"After hearing the evidence of those having knowledge of the occurrence and who were responsible for the condition of the track, bridge and equipment, and reviewing the facts above disclosed, our conclusion is that the failure of the bridge was occasioned by the rupture of the cover plate on top of post No. 8, which permitted the superimposed box girder, when loaded, to drop down 18 in. This in turn depressed the rails.

"We cannot definitely determine whether this rupture was due solely to the superimposed load or to some anteceden. cause; but there is the evidence of two witnesses who were on the ground that the first indication of the derailment occurred when the train was at a point immediately east of the bridge, where they saw a large amount of fire flying from under the lead engine on train No. 19. This, coupled with the evidence of both enginemen on train No. 19 that they made no application of the air brake at that point would lead to the conclusion that the train struck an obstruction. This is further borne out by the presence of the mark upon the top of the outer rail, east of post No. 8, and the marks of the flanges of wheels upon the cross ties just east of post No. 8, north of the outer main rail and between the inner main rail and the inner guard rail.

"Derailment of the locomotive at this point might have produced by impact a shock sufficiently severe to rupture the cover plate of post No. 8."

The chemical analysis of drillings taken from the ruptured plate, close to the fracture, showed carbon .033 per cent.; manganese, .025; phosphorus, .252; silicon, .115; sulphur, .006. Tensile tests, with the grain, showed elastic limit 28,440 lbs.; ultimate strength 46,830 lbs.; percentage of elongation in 2 in., 24; percentage of reduction of area, 21.62. Cold and hot bending tests and nicking tests were made, with satisfactory results. Photographs of the faces of the fracture show dark and light portions, illustrating the progressive character of the fracture.

Passenger Traffic in Japan.—"The gross earnings of the Japanese railways are 55 per cent. from passengers, and 45 per cent. from freight, as compared with 25 per cent. from passengers and 75 per cent. from freight in the United States. Japan proper, that is, exclusive of Formosa, Korea and Saghalien, has an area of about 150,000 square miles, with a population of about 51,000,000 people. The United States, proper, exclusive of Alaska and insular possessions, has an area of about 3,000,000 miles, with a population of about 95,000,000. These figures will show at a glance that the density of population in Japan accounts for the heavy passenger receipts as compared with freight. Passenger and freight rates in Japan, as in nearly every country in the world, are in conformity with surrounding economic conditions. The Japanese are very fond of traveling. All the trains are crowded. The passenger coaches are about 35 ft. long, with a center passage right through the train. The seats are on the sides, the same as in our street cars. About ten or twelve of these coaches are pulled by an engine of American make.—*Erie Railroad Employees' Magazine.*

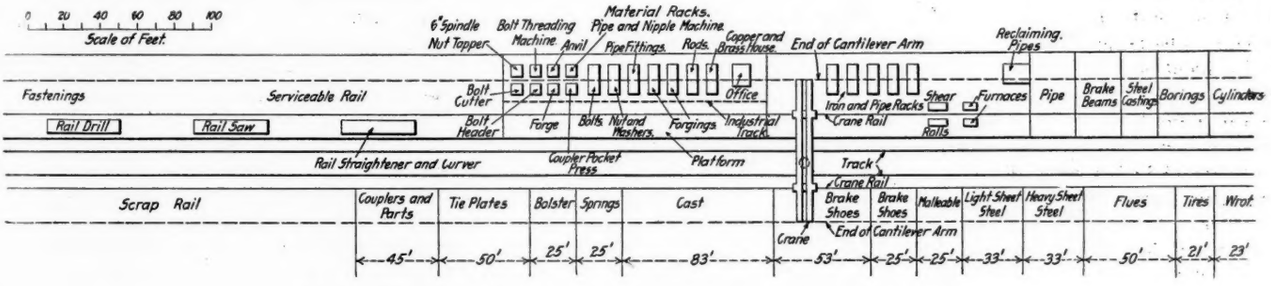
EFFICIENT ORGANIZATION FOR HANDLING SALVAGE.

A Systematic Plan Should Be Established for Reclaiming Serviceable Material and of Marketing Scrap to Advantage.

By H. C. Pearce,
General Storekeeper, Southern Pacific.

The importance and value of salvage on our railways has never been thoroughly understood or appreciated. While many roads are recovering hundreds of thousands of dollars in second-hand, serviceable material and applying it to their needs, as well as carefully classifying their scrap for the market, the work generally has not been handled with system, nor has its importance and scope been fully understood. The committee on recommended practices, appointed by the Railway Storekeepers' Association, presented a report at the last meeting in Buffalo, which quite fully covered this subject and was reported in the *Railway Age Gazette,* May 24, page 1160. Other articles in this paper worthy of special notice were: A description of the rail mill and storage yard of the Chicago, Milwaukee & St. Paul, at Savanna, Ill. (June 21, 1912, page 1572); and articles on Reclaiming Scrap Material, by J. S. Sheafe, engineer of tests, Illinois Central (September 1, 1911, page 441); A. A. Burkhard, New York Central & Hudson River (September 1, 1911, page 414); and C. C. Leech, Pennsylvania Lines (September 1, 1911, page 418).

All these articles are deserving of careful consideration and show that the men on the ground appreciate the savings that may be effected by the recovery and utilization of salvage on our railroads. Couple this with the broader plan of marketing, and place it under the direction of a thoroughly systematized business organization, and you have only to consider the volume in order to appreciate the net results.



Typical Layout of Scrap Bins and Tools for Reclaiming Salvage.

SUPERVISION.

The supply department should be required to take charge of all surplus, obsolete, scrap, second-hand and serviceable materials and prepare them for further use or market. Its purpose should be, so far as possible and economical, to apply the salvage to the railroad's needs and investigate and arrange for the sale of that which can be sold to better advantage than applied to the company's requirements. The purchasing power may be used in many ways to dispose of salvage. Agreements for appliances and equipment superseding older appliances should be made on the basis of the firm receiving the business taking over the equipment so released; for example, air compressors, lubricators, injectors, heating and lighting material; in fact, agreements for all appliances of this character should carry with them a market for the equipment or appliances superseded. The manufacturers or dealers have, in most instances, a broader market for this class of material, and they are interested in having their equipment applied. The railroad, on the other hand, gets the benefit of the immediate use of improved equipment without waiting for years before the equipment is entirely removed. The same applies to the purchase of iron and steel products. These agreements carry with them, in nearly all instances, a profitable salvage exchange.

There are many reasons why the supply department can handle the salvage on our railroads cheaper and to better advantage than any other part of the organization. The chief supply officer, being responsible for the providing of suitable materials at the lowest net cost to the company, less the salvage, is vitally interested in marketing the salvage to the best advantage.

RECOVERING SALVAGE FROM THE LINE.

Supply cars covering each division on regular schedules every month deliver all materials and supplies for operating and maintenance for the succeeding month, as well as for certain work which has been specified and arranged for. This service should be extended to the bringing in of all surplus, obsolete and scrap material, to be assembled at such assembling docks as may be agreed upon, based on geographical location, facilities, markets, etc. This has already been picked up along the right of way and assembled. It is then segregated and loaded at the same time the month's supplies are received with little or no additional expense. The salvage, thus fairly well segregated and loaded, is moved to the division or general assembling docks. Owing to geographical conditions on many of our railroads, it will be necessary to assemble the salvage at different points where it can be worked over and sorted to the best advantage. The divisional arrangement is preferable because the divisions recovering the materials usually take a greater interest in its application and use, as the division receives the benefit of the savings in its current operating expenses. On many large railroads practically all the salvage is brought to a general assembling dock. This plan has many economical features. It saves extra handling and tools, and warrants a sufficient organization to permit of its being handled to the best advantage and at the lowest cost, also placing it at the door of the best market. The object should be to assemble the salvage at the points where it can be handled to the best advantage, taking into consideration organization, facilities, markets, etc.

ARRANGEMENT OF TRACKS AND DOCKS.

The docks and tracks should be so arranged that the salvage may be unloaded directly from the cars with conveniently located locomotive or motor-driven cranes equipped with magnets. The docks should have suitable material racks, bins, etc., so that the serviceable material reclaimed may be sorted, marked and put away in its proper compartment for immediate use without additional handling through the storehouses. The material should be shipped direct to the point required, without further expense. In other words, the salvage should be placed in con-

dition, immediately upon receipt, either for the company's use, or for sale. It will greatly broaden the market to have the material for sale so arranged that it may be inspected by the users and dealers, and an official on the ground with authority to transact business. The dealers should be in a position to obtain exact knowledge of what there is for sale. In this way the delays and misunderstandings due to corresponding long distances with the buyer will be eliminated. Personal contact between the buyer and seller, and the opportunity to examine the material for sale, will enable the seller to obtain a better price. The purchaser will also be satisfied.

A simple form of accounting should be established, based on the market price of scrap, plus the handling and making over, with the proper percentage of over-head expense, the material to be issued on the basis of actual cost to produce in its present condition, plus its value as scrap salvage. A careful record must be kept of the cost of reclamation to prevent spending more in reclaiming than the material is worth. The net result of this will be to deliver to the users materials suitable for their use at a greatly reduced cost, which will be reflected in the maintenance charges, as well as in the education and discipline of all concerned. This alone is of inestimable value.

FACILITIES REQUIRED.

The ideal arrangement would be to have sufficient docks and tracks covered by gantry cranes to handle all salvage direct from the cars to the docks and bins, and where conditions will permit, to have the assembling docks reasonably close to the erecting shops, with a monorail man trolley running from the shops to the docks, carrying the salvage directly from the pits and floors of the shops to the scrap bins or sorting platforms. A typical layout is shown herewith which it is believed will be found practical. It can be extended or modified to meet conditions. The purpose of the plan is to manufacture the material at the point where it is assembled, with the least possible handling, storing it after its manufacture in racks and on platforms prepared for the purpose, adjacent to the machines and tracks, in such a way that the recovered material may be shipped out or delivered to the shops directly from the scrap docks instead of again passing through the storehouse. The expense of handling is thus reduced to a minimum. The tools should be arranged in the most convenient place for operating and should be as follows: Rail saw, rail straightener and curver rail drill, drop hammer, reclaiming rolls, nut tappers, lever shears, bolt cutter and threader, and pipe and nipple machine. These tools can be purchased and gradually placed in the order of their necessity.

INSPECTION OF SALVAGE.

The first inspection is made by the inspector or workman when the material is removed, and here is where our maintenance experts should fully exercise their technical skill and ability in the use of material. This applies to track foremen removing crossties as well as to car inspectors removing brake shoes. Nothing should be removed that has not fulfilled its usefulness, or until it can no longer be used with safety. It should be the aim of all shop, track and building foremen, and others, to see that the full usefulness of material is obtained before it is removed, and apply it as far as practicable, on the ground, so that little will remain to be reclaimed. Realizing that a great amount of material will be removed that has further usefulness, even under the most systematic and thorough application of the workmen's inspection, the second inspection must be made when the salvage is received at the assembling points or scrap docks. At each of these points there should be a sufficient number of experienced men to carefully segregate and remove all material that can be repaired, made over, or made to further serve its purpose. The remaining salvage must be carefully classified according to the railroad company's classification, which should be based on market conditions.

The third inspection is when the scrap salvage is loaded. In spite of both previous inspections there will be more or less material still left in the scrap salvage which can be made over and used. Under a thoroughly organized system there should be very little of this, but on many railroads where the former inspections are insufficient or incomplete, it will be found necessary to make a very careful inspection when scrap is loaded for market. A fallacy to be overcome is the working over of scrap by mechanics, smiths and others, who are able to pick out a great many serviceable articles. This is what has led to the general belief that more money is spent in trying to work over old materials than they can be bought for. This work must be handled in a systematic manner in order to obtain results. The smaller the profit, the greater need for system.

MARKETING.

It should be the business of the salvage department to make a market for all the salvage on the railroad. Railroads operating their own foundries, rolling mills, etc., are the largest users of salvage, and therefore afford the best market. The market will grow with the installation of the plan. Ranchers, mill men, dealers and others will naturally investigate and inspect the salvage on the ground. Uses for salvage will develop in all directions. Old pipe may be dipped, threaded and made to serve the purpose of water pipe, fence railings, etc. Old galvanized roofing may be used as sheathing for buildings. Pumps, engines, motors, and other surplus and obsolete machinery may be sold to ranchers, mill-men, contractors, etc. Once the organization is perfected, hundreds of uses that cannot be called to mind will develop. Scrap, instead of being handled through dealers, will go directly to the users and be sold for the highest prices.

PRINCIPAL ITEMS OF SALVAGE.

There is salvage in practically everything used on a railroad—from rails to tin cans. All rails and fastenings of every kind should be sorted out at one or more general assembling points, the various weights and qualities segregated and straightened, ends sawed off, punched and prepared for use wherever required. Thousands of tons of rail which now find their way into the scrap could be made available in this way for sidings, spurs and second tracks. This can never be done so long as the practice of allowing the rail to lie on the ground subject to use locally, or movement occasionally, is carried on. The sole excuse for this practice is that it saves the cost of handling, no regard being given to the fact that it represents hundreds of thousands of dollars that are not available. Being the largest item used on a railroad, it should receive first consideration, yet, with few exceptions, no attempt has been made to consolidate rail and distribute it from central distributing points. The same thing applies to crossties. All crossties should be maintained in stock and only delivered as wanted. Ties removed should be carefully inspected. Those which can be used for second tracks, sidings, etc., should be segregated and made ready for movement to where they may be needed; those suitable for fence posts should be handled in the same way and assembled in the general supply yards; the balance (what are commonly known as fuel ties) to be sold or used as such. It is impossible to understand by what method of reasoning our organizations have spent thousands of dollars in handling, accounting, inspecting and reporting on such items as stationery, waste and similar small supplies and allowed hundreds of thousands of dollars' worth of rails and ties to be distributed along the right of way.

Old lumber removed from bridges, buildings, etc., should receive close inspection. A large amount of serviceable material can be recovered for other purposes; the balance, sold for fuel, will pay for the cost of handling.

Brake shoes removed from high-speed passenger trains will give months of service on freight cars. Bolts can nearly always be straightened and re-threaded, nuts re-tapped, etc. Enormous amounts may be saved by removing couplings from steam and air hose. Pipes should have all the fittings taken off and put back into stock. Flues may be swedged and threaded and used for water line pipe. Brake beams may generally be repaired at

small expense. Oil carbon removed from locomotives makes excellent coke. Stock car cleanings can be disposed of in many places to good advantage. Staybolt iron scrap can be re-rolled into refined iron; coupler parts recovered; lanterns and lamps re-tinned; in fact, there is practically nothing that cannot be applied to further use or made to bring a considerable income.

SAVINGS THAT MAY BE EFFECTED.

It is doubtful if anyone is in a position at this time to make even an intelligent estimate of the savings that may be effected by a thorough organization, properly systematized and supported, and in charge of a broad-gage, capable officer, who will cover this subject from the time the material is purchased until it is finally disposed of by use or sale, and will be held responsible for providing the proper materials, when wanted, at the lowest net cost. On the Southern Pacific Company's Pacific System, a systematic plan was established three years ago for recovering serviceable materials from the salvage, and although we have been unable so far to secure all needed facilities and tools, the percentage recovered, based on the issues, has been steadily increasing.

The proposition is simply one of practicing real economy, which consists of making the most of what you have, never throwing away anything that may be utilized, and disposing of the salvage to the best possible advantage. The better the facilities and organization, the greater the net profits. The reclamation and disposition of salvage offers one of the largest fields for the practice of real economy on our railroads. On account of its close relation to the supply department, I believe it should be considered as an adjunct of that department. It has the organization and would require only a small additional cost for extra supervision.

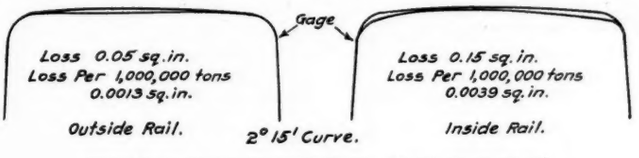
Doubtless the principal reason this subject has never received the consideration it should is that to carry it out to its fullest efficiency means an investment and increased payroll, both of which are closely scrutinized. Unfortunately, the payroll is generally considered the unit of measure and the purpose of every subordinate officer is to reduce it in every way possible. The same thing may be said of the savings. They are only reflected in the net results of the operation of the property and may be credited to other reasons than the one to which they are due, but the time has come when these matters will be thoroughly analyzed, and for this reason, it behooves every railroad employee to bend his efforts toward better control and conservation of the company's resources and the recovery and marketing of the salvage.

BELGIAN RAILWAY SCHEME IN CHINA.—After some delay regarding the appointment of a chief engineer, the great Belgian railway scheme—by which Belgian capitalists are to lend China $50,000,000 in connection with a contract for the construction of a railway between Honan-fu and Sian-fu (Shansi), with extensions westward to Lanchow-fu (Kansu) and eastward to the coast at Haichow (Kiangsu), the railway itself forming the security for the loan—is now progressing satisfactorily. Mr. Bray, who is not in favor with the Chinese, but who for many years has been the chief Belgian engineer in China, has been appointed temporarily to the post, while the engineers Orphanides and Sze have begun the survey for the line from Honan-fu to Lanchow-fu. The Belgians believe that it will be necessary later to increase the capital by one-half. The contractors have deposited $500,000 as bargain money and agree to pay China $5,000,000 within a year. China undertakes to purchase the sections of the line already built by private enterprise, one near Chinkiang-pu and the other from Honan-fu westward, approximately ten miles in length. The Belgians intend to provide half the capital, while the banks constituting the French interests in the Six Powers' Group are arranging to take up the remainder.—*Journal of Commerce, New York.*

TITANIUM RAILS.

Ferro-titanium first came upon the market a few years ago as a scavenger whose properties were those of removing the impurities from steel. In doing this it passes off with the impurities and leaves no trace of itself behind, so that an analysis of the metal that has been treated shows no titanium, unless such an excessive amount had been used in excess of that required to combine with the highly undesirable oxides and slags. Its application and use are very simple, yet its action is of such a character that it must be used in accordance with certain well-defined regulations, or it will not be able to do the work for which it was intended and no beneficial results will be obtained.

It is well known that the oxides contained naturally in steel are detrimental to it and that it is very desirable that they should be removed. The same statement holds for the nitrides which have a marked tendency to make the metal brittle. Titanium has a great affinity for oxygen and a great, though lesser, affinity for

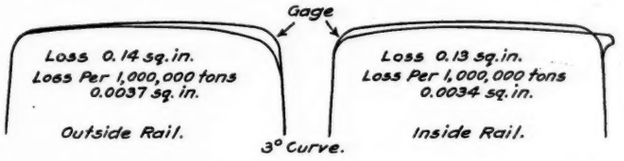


Titanium Open Hearth Rails, N. Y. C. & H. R.

nitrogen, it being the only known element that combines with these two gases. If, then, it is put in a ladle containing molten iron or steel that is impregnated with oxides, its affinity for the oxygen so contained is such that it will break up the original compounds, form a new combination with the oxygen so liberated, and rise to the surface with the slag in the form of titanic acid.

In the manufacture of open hearth steel by the ordinary process the deoxidizing is done with manganese which will reduce it to a minimum of from .08 to .25 per cent. If, however, after the manganese has been added and allowed to do its work, and ferro-titanium be added in sufficient quantity all traces of oxygen will be entirely removed.

The titanium should be added to the ladle cold. The ordinary method is to shovel it in when the ladle has been filled to about one-third its depth. The action of the titanium is very rapid



Titanium Open Hearth Rails, N. Y. C. & H. R.

and is accompanied by the evolution of considerable heat. The alloy first dissolves, the titanium seizing upon the oxides and nitrides, present as slags in all steels, and the resulting combination being very fluid and of low melting point, they rise out of the metal to the slag on top of the ladle. After it has completed its work of combining with the oxygen, it is necessary that some time be allowed for the products of this combination to rise to the surface of the ladle. If this time is not allowed, little or no benefit is derived from the use of the alloy. For open hearth work where a heat weighs about fifty tons about ten minutes is required, while for the smaller Bessemer heats three or four minutes will suffice. In the hurry to pour the heat it has frequently occurred that this full time allowance has not been given, with the result that the best results have not been obtained.

It is well known that the specific gravity of slag and the other impurities is less than that of steel so that the total weight of the pure steel in an ingot is reduced in direct proportion to the amount of slag included. If, then, something can be done to re-

move these impurities, it follows that the resultant metal will be denser as a whole than it would be had they been allowed to remain. This is the action that occurs in titanium steel, when the slags in the form of these small particles of oxides are removed by the titanium. As a proof of this it has been found that in steels of like chemical analyses the titanium treated steel is of higher specific gravity. Under the microscope titanium treated steels are vastly more free from included particles of slags and dirt.

It requires no argument to prove the desirability of freeing rail steel from the small slag enclosures that have shown themselves so capable of serving as the starting points for internal fractures. It must also be borne in mind that reheating, or rolling at high temperatures, will not serve to weld these defects. If they exist in the ingot they will exist in the rail and the pressure of the rolls or the temperature of rolling will not remove them.

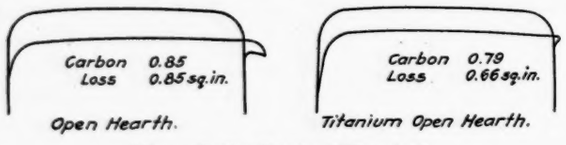
Again the denser and more homogeneous metal that results from this removal of the slag offers a greater resistance to wear. If the metal is tested in tension, it of course follows that the purer it is the stronger it will be because with a sound metal the stress is applied throughout the whole cross section of the test piece, whereas, under ordinary conditions, its cross section is reduced by the sum of the sections of the included slags. The greater homogeneity of the metal also tends to produce a greater ductility, so that the direct physical results obtained from the use of titanium in steel are to make it heavier, stronger and more ductile. With these good qualities added, it would be expected that the resistance to wear would also be greater and this, too, seems to be the case.

When titanium was first introduced the greater portion, if not all of the work, was done with Bessemer steel, and it was thought that its application would be limited to that process, but it has been found to be equally beneficial to open hearth steel and has been widely used in rails made by both processes.

SERVICE TESTS.

As an indication of the results secured in actual service from the use of titanium it will be of interest to examine a number of contours of worn rails that have been treated with titanium as well as of those that have been made in the ordinary manner. For this purpose selections have been made from rails that have been in the track for some time in various places where the wear is exceptionally severe.

A test was made in the tracks of the Delaware & Hudson, at Howe's Cave, N. Y., running for 16½ months. In this instance

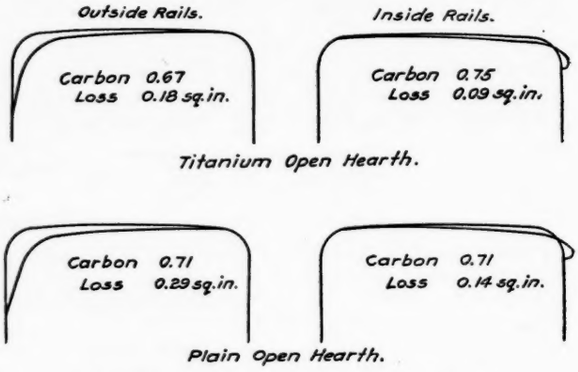


Worn Rails, Boston Elevated.

the test was made on two curves. Ordinary open hearth rails were laid on a 3 deg. 30 min. curve, while titanium open hearth rails were laid on a 4 deg. 8 min. The traffic over each curve was the same and the weight of all rails was 90 lbs. to the yard. On the high side of the curves the average rate of wear was .2825 sq. in. for the plain open hearth and .1825 sq. in. for the titanium treated rails. For the low side of the curve the plain open hearth showed an average wear of .145 sq. in. and the titanium treated, .09 sq. in. In the treatment of these rails 0.1 per cent. of metallic titanium was used. From this it appears that the rate of wear of the untreated open hearth rails was something more than 50 per cent. greater than it was with the titanium treated rails.

A test lasting for 214 days was made on a curve of 100 ft. radius on the Boston Elevated railway. It is well known that the wear of rails on this road has been very severe and in some places so rapid was it that it almost seemed impossible to keep rails in the track. In this test five rails were used. All were made by the open hearth process, only three of which had received the titanium treatment. They were all laid on the outside of the curve. Again the rate of wear of the plain open hearth rails was greatly in excess of that of the treated rails. For the former it averaged .755 sq. in., while for the latter it averaged .537 sq. in. Here, then, as at Howe's Cave, the rate of wear of the untreated rail was about 50 per cent. faster than that of the treated rails. In the diagrams are shown the rails of each kind showing the greatest amount of wear. An analysis of these rails showed a carbon content of .85 per cent. for the plain open hearth rail, and of .79 per cent for the titanium treated rail.

Finally the results of a trial of some open hearth titanium rails on the Hudson River division of the New York Central are given. It is impossible to compare the wear of these rails with



Worn Rails from Howe's Curve, D. & H.

that of rails of the plain open hearth type as there are none in the same section of the track here, but the rails which are taken from the high and low sides of the curves will show the rate of wear for an exceedingly heavy tonnage. These rails were rolled to the specifications of the New York Central, weigh 100 lbs. to the yard and are laid on curves of 3 deg. and 2 deg. 15 min. They have been in the track for two years and have carried a total tonnage of about 38,000,000 tons, much of it at a very high rate of speed. In the case of the 3 deg. curve the wear on the outside rail at the worst place was .14 sq. in., or at the rate of .0037 sq. in. per 1,000,000 tons, while on the 2 deg. 15 min. curve it has been at the rate of but .0013 sq. in. per 1,000,000 tons. In the latter case the wear has been the greatest on the inside rail, due probably to the heavy freight trains that have passed over it.

These results are uniformly good and it would seem that with such a record there should be no hesitation in regard to the matter. However, there is a difference of opinion as to the benefits to be derived from the titanium treatment due to the fact that a few failures to secure the desired results, but only in Bessemer rails, have been reported. The failure of these rails, after a very careful and painstaking investigation, can be traced to lack of care on the part of the mills in using the ferro-titanium in the proper manner. However, as a whole, the examples taken from practice go to show that the service which is being rendered by titanium-treated rails is better than that of the untreated product, for which the simple claim is made that the deoxidation of the metal makes it more dense and, therefore, better able to resist wear, while at the same time, as it is stronger, it is less liable to break than the same grade of metal which has not been treated in this manner.

HONDURAS RAILWAY CONCESSIONS.—It is reported from Tegucigalpa that the Honduras government has granted a concession to the business interests connected with the Guatemala Railroad for the construction of the Pan American Railway link across Honduras. It is understood that this agreement must be ratified by the Congress of Honduras. The line would connect up La Union, Salvador, with Chinendaga, Nicaragua.

COMMISSIONER McCHORD ON WESTPORT DERAILMENT.

Long Crossovers Demanded for All High-Speed Trains. Railways Called to Account for Neglecting Automatic-Stop.

The Interstate Commerce Commission, in reporting on the derailment at Westport, Conn., on the New York, New Haven & Hartford, October 3, for the first time issues a pamphlet in regular form like the pamphlets issued in rate cases, the report being made by Commissioner McChord and signed by Secretary John H. Marble, as in the case of rate orders. It was approved December 2. Two lawyers appeared for the road, Vice-president E. G. Buckland and Benjamin I. Stock. For the commission there appeared H. W. Belnap, chief inspector, and Philip J. Doherty, attorney. Mr. McChord held a hearing in New York City October 8, following the inspection of the situation on the ground by Inspector Belnap and others.

This derailment has already been reported in the *Railway Age Gazette* (October 11, November 22, and November 29, pages 692, 989, and 1035), and we copy from the present report only such parts of the statement of facts as give information in addition to that already published.

The derailment occurred at 4:44 p. m. The engine left the track 87 ft. beyond the crossover and ran further about 400 ft. before turning over. The first parlor car lodged against the firebox of the engine and probably the fire started here. The highway bridge is 300 ft. beyond the crossover. One of the bridge girders tore a hole in the side of the engine boiler, "making it seem at first as if the boiler had exploded." The rails are 100-lb. per yd.; ties, oak, chestnut and creosoted pine, 18 to the rail; rock ballast; roadway at this point in good condition. The block signal apparatus and the interlocking were both found in good condition. Examination was made of the circuit plans, the locking sheet and the dog sheet; and there was nothing to indicate that a wrong signal could have been given. Distances from the crossover eastward are: home signal, 240 ft.; home signal for the drawbridge, 2,058 ft.; distant signal, 4,075 ft. The dwarf signal blade at the crossover is about 2 ft. above the ground. The interlocking plant is not equipped with approach locking. Absence of approach locking did not contribute to the accident, but it might cause a similar accident.

The three crossovers in the four-track road at this point are crowded into a length of 705 ft., which is the distance between the tower and the facing point switch leading to the side track. With this side track switch out of the way, which the commission holds should be removed, independent of any consideration relating to the crossover, the crossovers could be made longer. "Facing point switches should not be used on high speed tracks where it is possible to avoid them, as they create an element of danger that is eliminated by the use of trailing switches."

The direct cause of this accident was disregard by the engineman of signals and rules. "Engineman Clark of second No. 53 was 55 years of age, and was the assigned engineman for this run. He entered the service as fireman in 1883; he was promoted to be an engineman in 1888, and was dismissed December 20, of that year, for responsibility for a collision. He re-entered the service as a fireman in 1893, and was again promoted to be an engineman in 1894, and had been so employed since that date. He was disciplined January 14, 1898, for passing a home signal at stop, at New Rochelle, and again July 7, 1905, for passing a home signal at stop at Naugatuck Junction. His habits were good, and he had been on duty five hours and 28 minutes when the accident occurred, after a rest period of seven hours and 35 minutes, previous to which he had worked 11 hours and 16 minutes in the 24-hour period from 3:40 a. m., October 1."

The report here goes on to quote the recommendations which appeared in the report made by Inspector Belnap on the derailment at Bridgeport in July, 1911.

At the hearing in New York, October 8, Vice-president H. J. Horn, asked what action had been taken on the recommendations of last year, replied that the only action taken had been "a stiffening up of discipline." No new devices had been installed because nothing had been found which was deemed useful. Asked if lengthening the crossover would not decrease the danger, he replied: "No. I would think in the end it would make a worse situation; it is simply putting a premium on the violation of a rule." Mr. McChord says it is hard to understand this conclusion, because there is a greater chance for an accident with a short crossover than with a long one. Mr. Horn said that requiring a full stop before setting the switches for the crossover would not increase safety as, if the train proceeded along the straight track, there would be a probability of running into the rear of a train in the next block; "you change one accident for another, that is all." Mr. McChord answers this by saying that in this case the evidence shows that Engineman Clark applied the brakes immediately after his engine passed the home signal.

Commissioner McChord called attention to the recommendations of the Block Signal and Train Control Board in its last annual report, in which the development of automatic stop apparatus was recommended. Mr. Horn said that no action had been taken on this other than to investigate what was available; these investigations had resulted in no specific conclusions.

Taking up again the subject of roadway the report says: As previously noted, the roadway and track conditions in the vicinity of the accident are good, and the construction of the crossover was substantial. All renewals are made with creosoted ties, and on these ties tie-plates are used, as well as screw spikes. In some places the chestnut ties are badly worn, due to the base of the rail cutting into them, in some instances to a depth of three-fourths of an inch, but a sufficient number of tie-plated creosoted ties are in use to maintain safe track. At the crossover practically all the ties were new and screw spikes were use, and the track conditions at this point were good.

The speed limit of 30 miles an hour over the drawbridge is habitually disregarded, trains crossing the bridge at 45 to 55 miles an hour. Vice-president Horn has no personal knowledge of this violation; he considered it safe to cross the bridge at higher speed than allowed by the rules. Asked how it was that this violation was treated differently from a violation of the 15-miles-an-hour rule at No. 10 crossovers, he said: "One is safe and the other is suicide."

Taking up the general subject of speed, the report quotes a bulletin notice issued last September calling on conductors and enginemen to make better time with passenger trains, especially in the matter of delays at stations; enginemen being enjoined, however, not to run beyond a safe speed or disregard slow orders. Enginemen frequently receive letters calling for explanations of delays, and in one case a loss of one minute between Stamford and New Haven, 40 miles, was the subject of a letter. The engineman who received this letter, being questioned, said that he did not regard it as a criticism, but simply as an effort to find out what was the cause of the delay. The report holds that many enginemen, nevertheless, would regard it as a criticism and would be led to give undue prominence to the question of maintaining speed; and this would cause them to take chances.

Continuing, the report says: "Excessive speed as a factor in train accidents deserves serious consideration. The remarkable increase in speed and weight of trains within recent years, and the crowding of tracks and terminals caused by movement of the enormously enlarged volume of railroad traffic, have greatly increased the duties of employees and multiplied the chances of error on their part."

Discussing the fire the report says that if the parlor cars

had been of steel, it might have been possible to have saved the lives of some of the injured passengers; and it repeats the commission's former recommendation that steel cars should be adopted everywhere. The commission holds that the shortest crossover reasonably safe for the passage of trains at "normal speed" is No. 18 or No. 20. "Proper measures for the safety of the traveling public have not been provided where crossovers are installed which may be used with safety only at low speed and which are protected simply by signals and rules requiring reduced speed. Longer crossovers should be installed at all points where high speed passenger trains are to be diverted from one track to another track . . .; then if signals or rules were disobeyed, or if an engineman were incapacitated, the possibility of disaster would be greatly reduced, if not entirely eliminated." Until long crossovers are installed, the full stop should be required [as was recommended by the Connecticut commission].

The declaration of the New Haven officers that Inspector Belnap's recommendation last year was not a recommendation of the Interstate Commerce Commission is characterized as a resort to a technicality to evade the point at issue.

President Mellen has notified the commission of his order to install long crossovers and to require the stopping of trains (the same notice that he sent to the Connecticut commission).

Taking up the subject of accidents generally the commission prints the statistics of the past four years, which, condensed, are as follows:

Train Accidents in the United States—Four Years.

	1912.	1911.	1910.	1909.
Collisions	5,483	5,605	5,861	4,411
Damage to cars, engines and road*	4,330	4,302	4,629	3,109
Killed in collisions	378	436	433	342
Derailments	8,215	6,260	5,918	5,259
Damage to cars, engines and road*	7,197	5,550	5,195	4,372
Killed in derailments	394	349	340	264
Total collisions and derailments	13,698	11,865	11,779	9,670
Damage*	11,527	9,852	9,824	7,480
Killed	772	785	773	606

*Thousands of dollars.

It is a deplorable fact, says the report, that train accidents have steadily increased in number and magnitude since 1909. Continuing, it says:

"Railroad managers and their employees, as well as state and federal commissions, must unite in a determined effort to reduce these harrowing railroad disasters to the limits of the unavoidable. This can only be done by ascertaining the real causes of train accidents and taking proper measures to eliminate them.

"This commission is making every effort possible in this direction and has been very ably assisted in the present investigation by the Public Utilities Commission of Connecticut—in a number of other instances by the commission of other states, as contemplated by the accident investigation law of 1910. Railway managers and their employees seem to have awakened to their responsibilities in this matter. This is shown by the general formation of safety committees, and some railroads have shown a reduction in their casualty list that is worthy of commendation.

"But notwithstanding these facts avoidable train accidents continue to occur and exact an increased toll of life and limb. Such accidents occur on large railroads as frequently as on small ones; on well-managed roads as well as on roads that are less well managed; on block-signaled roads as well as on roads where the train-order [time interval] system is still in force; and by far the greater number of them are due to the same fundamental cause, namely, fallibility of the human element responsible for the safe operation of trains.

"It cannot be assumed that employees whose long service records have shown them to be competent, reliable, and temperate should suddenly and without reason deliberately elect to take chances which may involve death to themselves and many others under the most distressing circumstances. . . .

"The commission is satisfied that the neglect to comply with the recommendations in its report on the Bridgeport wreck was largely a contributing cause of the Westport accident and its accompanying loss of life. . . . If railroad directors and managing officials remain passive and give to such occurrences no such serious consideration as the situation demands, then it becomes the duty of public officials to bluntly and plainly point out to them their duties as trustees of the safety of the traveling public. The stiffening up of discipline did not seem to reach cases of speed contrary to the rules at bridges. . . . Devices to automatically stop trains are in constant use in tunnels and elevated railroads in and about New York. In the adaptation of some similar device to use on such a railroad as the New York, New Haven & Hartford the practical operating difficulties are by no means insuperable.

"The whole result of such consideration as officials of this railroad have given the subject is a pessimistic hopelessness, indicated by testimony that 'we are at our wits' end,' etc. The operating vice-president when asked what hope he saw of being able to accomplish anything to prevent the recurrence of these accidents answered that he knew of nothing that would prevent absolutely such recurrence. A decent regard for the safety of the lives of those who travel does not justify a great railroad in passively awaiting until some private inventor at his own cost develops to full perfection appliances which will 'absolutely' prevent the occurrence of such accidents. All large railroads whose capital and earnings justify it should make such experiments with modern mechanical appliances intended to promote safety of travel as will aid and promote the approach, if not the actual attainment, of the ideal of absolute prevention of accident. The block signal and train control board reported that there were train-control devices now in existence which, although not absolutely perfect, were such that they should be taken up experimentally by railroads with a view to their practical development and mechanical perfection for general use upon railroads. . . . When a diversion from the lookout for a few seconds on the part of an engineer, caused by perhaps some imperative duty to be performed on the machinery in the inside of his cab, may cause disaster to his train and death to his passengers, there should be no hesitation in actively taking up the perfection and installation of such supplementary appliances as will bring the train to a stop where danger threatens.

"Wreck prevention is the highest duty of railroads. This obligation is not satisfied by merely making rules which prove insufficient in operation. If the "human element" repeatedly fails, then safety requires that the highest degree of mechanical skill be applied to properly supplement the human element at the particular point of danger. To adequately satisfy their obligations to passengers, railroads should avail themselves of the use of some workable automatic train stop, and in high-speed trains should use cars of all-steel or at least steel-underframe construction in place of wooden cars. The vice-president of this railroad in charge of engineering and maintenance of way said of the automatic train stop, *'I think it has got to come in some form,* but the consensus of opinions of engineers is that there is no device that is suitable for fixed operations.' The query of this railroad official, 'Then why should not a train be wrecked that runs signals?' seems to be answered by his own statement that the automatic train stop has 'got to come.'

"Railroads ought to unitedly experiment with the automatic train stop until a device of practicability for general use shall be available. Until it does come the alternative recommendation of this commission [requiring full stop] should be strictly complied with. Until some better safeguard can be devised, and this railroad has suggested none, compliance with this recommendation places no undue burden upon railroads and will in our opinion prevent accidents of this character in the future.

"The recommendations herein made are addressed to all railroads operating under similar conditions to those herein disclosed."

FACTORS IN THE SELECTION OF LOCOMOTIVES.

Lively Discussion of a Paper on This Subject Before the Railroad Session of the Am. Soc. of Mechanical Engineers.

Two papers were presented before the Railway Session of the American Society of Mechanical Engineers on Thursday morning, December 5. The first one on Train Lighting was abstracted in the *Railway Age Gazette* of December 6, page 1096. After an extended discussion of this paper O. S. Beyer, Jr., of the Rock Island Lines, presented a paper on Factors in the Selection of Locomotives in Relation to the Economics of Railway Operation.

ABSTRACT OF MR. BEYER'S PAPER.

"The problem of locomotive design is comparatively simple when it is clearly known what is desired. The possibility of effecting operating results by the introduction of improved locomotives alone, or by their use in connection with such changes as grade revision, is not as fully appreciated as it ought to be. To make an intelligent selection of motive power for a railroad, it is necessary to study the effect which various types and sizes of locomotives will have on operating expenses and fixed charges. Statistics published by the Interstate Commerce Commission covering the entire railroad field of the United States show that 55 per cent. of the operating expenses are affected more or less directly by the motive power.

"The wide range of motive power now available will have to be considered in future double track and relocation work, grade reduction, elimination of rise and fall, and curvature and distance, in order to effect the greatest economy possible for the capital expended. It should no longer be necessary when relocating a division to increase its capacity and reduce operating expenses, to go to extremely heavy capital expenditures to reduce grades to the minimum of 0.2 or 0.3 per cent., as it is usually much cheaper to provide locomotives of greater power."

With this introduction Mr. Beyer went on to outline in detail just what factors should be considered in the selection of new motive power. After commenting on the necessity of investigating carefully the nature of the business handled and the topography, train speed and train resistance of the territory in which the locomotives are to be used, he outlined the general characteristics and adaptability of the different types of locomotives available.

A section was then devoted to the permanent plant and its relation to motive power selection, including a brief consideration of track, bridges, passing sidings, terminal yards and engine terminals, including roundhouses, turntables, coaling stations, watering cranes, ash plant, sanding facilities and locomotive repair shops. The statement was made that good track, laid with 90 and 100 lb. rail, will readily allow axle loads of 60,000 lbs.

The items of operating costs and overhead charges which should be considered in such a study are the following: Transportation expenses, including fuel, water, lubricants for locomotives, other supplies for locomotives, engine house expenses, train supplies and expenses, enginemen's wages, and trainmen's wages. Maintenance of equipment, including locomotive repairs and freight train car repairs. Maintenance of way and structures, including ballast, ties, rail, other track material; labor, roadway and track; bridges, trestles and culverts; buildings, fixtures and grounds. Overhead charges, including interest on locomotives and improvements to permanent plant; depreciation of locomotives and improvements to permanent plant; and taxes and insurance on locomotives and improvements to permanent plant.

In commenting on fuel, Mr. Beyer said: "Numerous tests and service records have shown that large superheater mikado locomotives which have been placed in service recently haul trains of 45 and 50 per cent. greater tonnage with the same amount of coal that was formerly consumed by the consolidation locomotives they replaced. Even the coal consumption of Mallet engines with grate areas up to 100 sq. ft. has not grown in any way proportionate to the increase in their hauling capacity. Modern engines when running at shortened cut-offs over those portions of the road other than the ruling grades exhibit a still greater economy than when working on the heaviest grades. Some service tests of recently built mikado engines on the Delaware, Lackawanna & Western clearly demonstrated these facts. Their economy in fuel consumption as compared with that of the old consolidation type, both operating over heavy grades at full load, was 20 per cent. The economy effected over easy grades while running at shortened cut-offs was 39.3 per cent., almost twice as much. The average was 29.1 per cent.

The paper closed with this paragraph: "In designing new locomotives all of the conditions must first be analyzed and then the design made to suit them. The actual design of the engine finally chosen may be approached with confidence because of accumulated knowledge and experience. Due to the great possibilities of favorably effecting operating results by building locomotives which are exactly suited to their work, a study of the conditions becomes vitally important. To show what these conditions are has been the object of this paper. The fact that the most powerful locomotives of most approved design are also the most economical should be more generally appreciated. It is to be hoped that the future will see more advantage taken of the modern locomotive in accordance with its possibilities in relation to grade revision and its ability to reduce operating expenses to a minimum. The ultimate benefits which will result will certainly be justified to the fullest extent."

In the formal presentation of his paper Mr. Beyer called attention to the fact that the principles outlined had been applied to the selection of a new class of locomotives on one road with splendid results.

MR. VAUGHAN ON COMMON STANDARD LOCOMOTIVES.

H. H. Vaughan, assistant to the vice-president of the Canadian Pacific, emphasized the importance of having standard locomotives and maintaining these standards until conditions change so much that it is possible to design another line of standard locomotives, making a distinct step in advance, rather than to modify the standard types from time to time. The time for standardization is before the equipment is built and not afterward. The Canadian Pacific now has about 865 standard locomotives out of a total of 1,800 or 1,900 on the system. It is always possible to introduce changes in the design of standard locomotives, bearing in mind that the new arrangement must be made so that it can completely take the place of the old part for renewals or repairs.

The advantage of standardizing the motive power may be summed up as follows: The standard locomotives can be transferred from one part of the road to another, when business becomes heavy on one section, without having to provide a new storehouse stock, or have the power crippled because of not having the proper parts in stock. It is also possible to keep the shop cost of the engines down because of fewer variations in the size and design of the parts. Where standard locomotives are used it has been found that the division officers are much more likely to offer suggestions as to improvements. Of course, the standardization has disadvantages, one of which is that it is not always possible to immediately take advantage of improvements in the permanent plant. The advantages of having common standards which can be used on any part of the system and with which the men over the entire system are familiar, greatly offset this, however.

W. F. KIESEL, JR., ON POSSIBILITIES OF ATLANTIC TYPE.

In speaking on the possibilities of the Atlantic type W. F.

Kiesel, Jr., assistant mechanical engineer of the Pennsylvania Railroad, said:

"To determine the possibilities, the limitations must first be known. The limitations of paramount importance are those governed by the carrying capacity of the track and roadbed. Assuming as a basis good roadbed, 22 in. spacing of ties and 100-lb. rail, it will be possible to use a weight of 70,000 lbs. per pair of drivers. The maintenance of way department will be inclined to say that this figure is too high, but there are possibilities of reducing the weights of reciprocating parts by the judicious use of alloy metals and by careful design, resulting in reduction of counterbalance, which in turn reduces the strain on the rail. One pound reciprocating weight per 100 lbs. of maximum piston pressure is within the bounds of possibility. For an Atlantic type locomotive this would permit using counterbalance for reciprocating parts of one-third their weight. At very high speed there would be no more strain on the rail than that induced by heavy locomotives now in service. The load on front and trailer trucks may be taken at 110,000 lbs. The total weight of this imaginary locomotive would then be 250,000 lbs.

"There are few possibilities of improvements in the engine itself. The utilization of heat-treated steel and cast-steel cylinders will reduce weight, which reduction can be used for increase in boiler. The development of the possibilities of the boiler will bring about improvements of greatest import. The superheater and brick arch have already raised the line between non-stoker and stoker locomotives 50 per cent., leaving all Atlantic type locomotives well within the non-stoker class. The indications are that great steaming capacity can best be obtained with flues of moderate length, and that the generally accepted theory that long flues increase boiler efficiency is not altogether correct.

"Before further developing this imaginary locomotive permit me to present some average figures obtained from an Atlantic type locomotive, on the Pennsylvania Railroad locomotive test plant, at Altoona, Pa., as a basis for possible boiler performance. The general characteristics of the locomotive tested are as follows:

Weight	237,000 lbs.
Boiler pressure	205 lbs.
Cylinders	22 in. x 26 in.
Drivers	80 in.
Fire heating surface	3,090 sq. ft.
Grate surface	55 sq. ft.
Flue diameter	Outside, 2 in.; inside, 1¾ in.
Flue length	13 ft. 9 in.

"The boiler was equipped with a long brick arch, a combustion chamber, and a superheater. Forty tests were made, eight of two hours each, nine of one and one-half hours each, seventeen of one hour each, five of one-half hour each, and one of fifteen minutes. The maximum speed was 360 revolutions per minute. In each test the speed, cut-off, pressure, and power developed were maintained as uniform as possible. In the various tests the average indicated horse power developed ranged from 756 to 2,355. Nineteen tests, with average indicated horse power ranging from 756 to 1,700, averaged 2.35 lbs. of dry fuel per indicated horse power. Thirteen tests with average indicated horse power ranging from 1,700 to 2,000, averaged 2.71 lbs. of dry fuel per indicated horse power. Eight tests, with average indicated horse power ranging from 2,000 to 2,355, averaged 3.08 lbs. of dry fuel per indicated horse power. For this last lot of eight tests the average steam per indicated horse power was 17.03 lbs., and the minimum was 16 lbs. The maximum evaporation was 38,846 lbs. per hour, or 12.6 lbs. per square foot of fire heating surface per hour, equivalent to 52,084 lbs. per hour, or 16.9 lbs. per square foot of fire heating surface per hour from and at 212 deg. Fahr. These tests indicate the possibility of one indicated horse power per 100 lbs. weight of locomotive, or for one and one-third square feet of fire heating surface, at 80 miles per hour.

"Returning now to the imaginary locomotive weighing 250,000 lbs.; the weight on drivers, 140,000 lbs., limits the drawbar pull in starting to about 31,000 lbs. The boiler can be made sufficiently larger than that of the locomotive tested to furnish steam for 2,500 indicated horse power maximum, available for short periods in emergency. For trains of the present day more than 1,800 indicated horse power would seldom be required. At 16⅔ lbs. of steam and 2.5 lbs. of dry coal per indicated horse power, this would require 30,000 lbs. of water and 4,000 lbs. of coal per hour."

"What can be expected from such a locomotive? This question can best be answered by determining how much power is required in fair weather to pull ten cars, weighing 600 tons, assuming that the engine and tender together weigh 200 tons. The starting power is just sufficient to start this train of 800 tons on a 1 per cent. grade. The indicated horse power necessary to maintain a given speed under various grade conditions is given in table below:

40 miles per hour on 0.75 per cent. grade	2,030 indicated horsepower.
40 miles per hour on 0.5 per cent. grade	1,600 indicated horsepower.
50 miles per hour on 0.5 per cent. grade	2,175 indicated horsepower.
50 miles per hour on 0.2 per cent. grade	1,535 indicated horsepower.
60 miles per hour on 0.2 per cent. grade	2,085 indicated horsepower.
60 miles per hour on level tangent	1,575 indicated horsepower.
70 miles per hour on level tangent	2,160 indicated horsepower.

"From what has been determined above, based on facts, it would seem that 'the possibilities of the Atlantic type locomotive' are equal to the requirements of present day passenger service, for the locomotive weighing 250,000 lbs., if given 3,300 square feet of *effective* fire heating surface, would be capable of developing a maximum of

2,160 indicated horsepower at 40 miles per hour.
2,280 indicated horsepower at 50 miles per hour.
2,377 indicated horsepower at 60 miles per hour.
2,452 indicated horsepower at 70 miles per hour.
2,510 indicated horsepower at 80 miles per hour."

A. W. GIBBS ON WHEEL LOADS.

A. W. Gibbs, chief mechanical engineer of the Pennsylvania Railroad, brought out the fact that too much stress is laid upon the static wheel load and too little on the dynamic load due to the unbalanced weights. The real problem is to reduce the total effect of the static plus the dynamic, and this calls for greater attention to the design of the reciprocating parts. C. D. Young, engineer of tests of the Pennsylvania, who followed Mr. Gibbs, said that the Pennsylvania Railroad had under consideration a design in which it was expected that a material saving would be made in the weight of the reciprocating parts by the use of alloy steel.

F. F. GAINES ON BOILER DESIGN.

F. F. Gaines, superintendent of motive power of the Central of Georgia, said in part:

"There are many items to be considered in the proper selection of motive power. I will only call attention, however, to the question of fuel economy and boiler capacity—in other words, boiler design. There have been few radical modifications in boiler design other than the general introduction of superheated steam, except in a few isolated instances. The results obtained by Dr. Goss in the Coatesville tests indicate, however, that there should be greater firebox volume and heating surface, and that the ratio of firebox heating surface to tube heating surface should be materially increased. With from 40 per cent. to 48 per cent. of the evaporation from the firebox sheets, it would seem logical to increase firebox heating surface and decrease tube heating surface. The results of the Coatesville tests, while a surprise to many, were anticipated by a few. The Philadelphia & Reading has a large number of its engines in which the ratio between firebox and tube heating surface is relatively high (one to six), and with tubes from about nine feet in length on American type passenger power to only 13 feet 6 inches on the heaviest types of consolidation locomotives. These results were obtained by the use of the Wooten type boiler with large grate area for anthracite coal, and a vertical brick wall at rear of the combustion chamber. The brick wall retards the flow of gases and also gives a better opportunity for combustion, as well as changing the path of the gases and forcing them against the crown sheet. The combustion chamber furnishes additional firebox heating surface and more volume in which to complete combustion. These engines, while designed for anthracite coal, occa-

sionally got into soft coal territory and had to use it. The grate area was too large for maximum economy, but the results were excellent, notwithstanding.

"Impressed with the above experience, a trial was made of arranging a boiler with a suitable grate area for soft coal, with a combustion chamber. The back end and one waist course were removed from the original boiler and replaced by a new back end. Carefully conducted tests showed a coal economy of 40 per cent. over a sister engine and 15 per cent. over the best design of engine of similar power, but with more liberal heating surface. In addition to the fuel economy obtained, the shielding of the tubes by the firebox wall has resulted in the engine making over four times the mileage of other engines in the same district before safe ending flues. During this period the engine has seldom if ever been reported to have flues blown, while with certain fuel conditions engines in the same territory have required blowing every round trip.

"The most radical improvement that can be made in the locomotive, and one that will be rapidly developed, is the use of greater firebox volume and heating surface. This is readily obtained by using a suitable grate area and combustion chamber. In fact; from past experience it would not be surprising if ultimately a flue length of 16 ft. would become a desirable maximum, and the combustion chamber be substituted for the remaining distance."

In commenting on Mr. Gaines' suggestion, C. D. Young of the Pennsylvania said that a study of the relation of the length and diameter of the tubes was probably of equal importance with the relative increase in firebox volume and heating surface.

UNIFORM LOCOMOTIVE CYLINDERS.

C. C. Trump told of 35 European locomotives that have been equipped with uniflow cylinders designed by Professor Johann Stumpf, of the Technical High School at Charlottenburg, near Berlin. The cylinders are so arranged that the inlet for the steam and the exhaust are separate and the steam flows in only one direction. It is admitted at the hot end of the cylinder and is exhausted through ports in the side of the cylinder controlled by the piston, so that the inlet is always maintained hot while the exhaust is cold. The cylinder condensation is thus practically entirely eliminated. Tests indicate that these locomotives are from 10 to 25 per cent. more efficient than those built with the usual type of cylinders.

G. R. HENDERSON ON FEED WATER HEATERS.

G. R. Henderson, consulting engineer of the Baldwin Locomotive Works, in commenting on feed water heaters, said: "More recently an extension of the boiler has been converted into a multitubular feed water heater and water from the injector is passed through this section before reaching the boiler proper. As some modern types of locomotives give ample space for a very long boiler, there is no difficulty in providing such a section using the heat after it passes through the boiler tubes proper. Experience with this type of feed water heater has been somewhat peculiar; in some cases very good results were obtained both in economy and in condition of the heater; but in other cases more or less corrosion has been found in the various portions of the heater, whereas there was no evidence of such corrosion in the boiler proper; these conditions have been more aggravated when good water was used than when water carrying scale and encrusting matter was supplied to the boiler. In an attempt to overcome this corrosion in some cases the heater has been practically coupled to the steam space with circulating pipes both to the top and bottom so that it is really an extension of the boiler and will only run partially full of water instead of entirely full, as when originally designed as a heater. The strangest part of this problem is that we find when such connections are made the apparatus does not seem to lose its economical value as a heater. There is apparently no increase in fuel required when these circulating pipes are connected with the boiler.

"Some builders place a diaphragm sheet a few feet back of the flue sheet and extended as high as the flues, injecting the feed water into this front section and letting it flow forward over the diaphragm as necessary. While we do not know of any comparative tests made to determine exactly the fuel economy of this device, it seems as if this arrangement of connecting the heater directly with the boiler, so that it practically forms a part of it, is likely to be more satisfactory in the long run than when it is used as an individual heater for heating the water in its passage to the boiler without allowing any opportunity for the gases contained in the water to escape, as can be done with the circulating pipes."

S. HOFFMAN ON THE SUPERHEATER.

S. Hoffman, vice-president of the Locomotive Superheater Company, said in part: "Superheaters are being applied to practically all engines now building and the question when selecting new power is not whether a superheater shall be specified or not, but what can reasonably be expected from the application of the superheater to the particular engine in its particular service and what consideration should be given to the design of the superheater and to the general locomotive design in order to obtain a locomotive of maximum efficiency. The principal advantage to be derived from the application of an efficient superheater is a decrease in steam and fuel consumption and indirectly an increase in the steaming capacity of the boiler, which is equal to a corresponding increase in the hauling capacity of the locomotive. In speaking of superheaters as applied to locomotives, only such devices shall be considered as are capable of developing and maintaining a high degree of superheat averaging from 200 to 250 deg. above the saturation point.

"The principle which has been generally adopted in the design of locomotive superheaters is that of a superheater consisting of coils or units disposed in large boiler flues, with the forward ends of the superheater units suitably connected with a steam collector casting in the smokebox. The superheater unit pipes go within 2 ft. of the firebox tube sheets and are exposed at their extreme ends to temperatures of from 1,400 to 1,600 deg., making the superheater capable of developing a superheat of from 200 to 250 deg. Steam of such high degrees of superheat can be exposed to the cooling action of the steam chest and cylinder walls without condensation and at the same time has about 30 per cent. greater specific volume than saturated steam of the same pressure. A large part of this increased specific volume is again lost before expansion of the steam in the cylinders takes place on account of the cooling action of the steam chest and cylinder walls. While the superheat of the steam leaving the superheater may be 200 to 250 deg., the average superheat of the steam in the cylinder at the moment the cut-off takes place is hardly more than 100 deg.; but the entire elimination of all losses through condensation, together with the remaining increased volume of the steam, effects under average conditions a saving of 30 per cent. and more in the steam consumption per indicated horse power, which gain corresponds to a saving in fuel consumption of from 20 to 25 per cent., compared with a saturated steam locomotive working under the same conditions.

"The real value of a locomotive from the motive power point of view must be ultimately measured by the tractive effort which it is able to exert on the drawbar at a certain speed. In order to bring out what bearing the above mentioned saving in steam and fuel consumption has on the hauling capacity of the locomotive, the following example is given: Assuming two locomotives of the same general dimensions, one being equipped with a high degree superheater. Under average working conditions, the superheater locomotive will show an economy in coal consumption of about 20 per cent., if the same indicated horse power is developed by both engines. If the superheater engine is now forced so as to burn the same amount of coal as the saturated steam engine, and assuming that this increased amount of coal can be burnt as efficiently in the superheater boiler as in the saturated steam boiler and that the increased volume of steam

can be expanded in the cylinders as efficiently as in the saturated steam engine, then the indicated horse power developed would be 100 ÷ 80 I. H. P. or 25 per cent. more than in the saturated engine. At the ordinary speeds of passenger locomotives about 70 per cent. of the cylinder power is available at the drawbar. Consequently an increase of 25 per cent. in indicated horse power represents an increase in haulage capacity by 25 × 100 ÷ 70 = approximately 36 per cent.

"The above two assumptions bring us to two principal requirements for the maximum efficiency of superheater locomotives. The thermal efficiency of the boiler must not be reduced by the application of the superheater. With the type of superheater now generally adopted, no changes are made in the firebox, but the tube heating surface is altered by transferring part of it into the superheater. The superheating surface is not quite as efficient in heat transmission as the evaporating surface on account of the poor conductivity of superheated steam. In order to make up for this the steam must be forced to pass through the superheater pipes at high velocity even at the risk of wire drawing, and the superheating surface must be so disposed in the gas current as to offer each cubic inch of gases passing through the superheater more heating surface than the gases find in their passage through the ordinary boiler tubes which are in contact with water. Further, the total gas area through all boiler tubes must not be materially reduced by the application of the superheater and the boiler tubes and flues must be so proportioned and arranged that the stream of combustion gases emerging from the firebox is so subdivided that the necessary amount of gases is diverted through the superheater, in order to furnish the required degree of superheat. These requirements regarding the subdivision of heating surfaces and gas areas have to my knowledge first been recognized by Dr. Wilhelm Schmidt, of Cassel, Germany, who is also prominently responsible for the introduction of highly superheated steam in stationary and marine practice.

"It is not always possible for the designer to meet exactly these requirements, but from a great many cases it can be said that under average conditions the total gas area through all boiler tubes is not reduced more than about 5 per cent. and the combined total heating surface based on the fire side of the tubes is increased by the same percentage through the application of the superheater. This makes a somewhat sharper draft necessary for the development of the maximum power. The exhaust nozzle of the superheater locomotive has at any rate to be smaller than in the saturated steam locomotive on account of the smaller volume of exhaust steam available. These considerations indicate that the superheater boiler uses the gases of combustion just as efficiently as the saturated steam boiler and therefore as far as the boiler efficiency is concerned it would be possible to make practical use of the above mentioned theoretical increase in hauling capacity.

"The second requirement assumes that the increased volume of steam be expanded as efficiently, or in other words, that the same cut-offs be used as in the saturated steam engine. This would mean a corresponding increase in cylinder dimensions which in many cases is not possible on account of limitations in adhesive weight, strength of running gear and other limitations. There will always be an increase in hauling capacity obtainable, but whether the theoretical maximum can be obtained depends on the size of cylinders, and depends also on the quality of the saturated steam engines with which the superheater engine is compared, or to which the superheater has been applied, whether the engine is correctly proportioned or over cylindered, or deficient in boiler capacity, etc. It depends also on the service in which the locomotives are used; whether the service is such as to be favorable to developments of higher degrees of superheat and more or less unfavorable to the saturated steam locomotive. In switching service superheater engines make a very favorable showing, although only a moderate degree of superheat is being developed, but the improvement in efficiency is so remarkable because the saturated switch engine is the most inefficient locomotive type. Under all these varying service conditions the increased hauling capacity of superheater locomotives obtained in practical service varies between 20 and 30 per cent., and frequently even more.

"Obviously, any appliance which improves the combustion and raises the firebox temperature will tend to raise the degree of superheat and thus help to increase the efficiency of the superheater. The only efficient device in this respect is a long brick arch, and for this reason the application of brick arches in superheater locomotives is highly recommended. All these considerations indicate that the increased hauling capacity of the superheater locomotive is principally caused by the increased steaming capacity of the boiler.

"The opinion has been frequently advanced that the mean effective pressure in the cylinders is increased by the use of highly superheated steam and that this is the source of the increased hauling capacity of the superheater locomotive. This is not the case. If the superheater engine has the same general dimensions, the same cylinders and boiler pressure, and is worked at the same cut-off and at the same speed as the saturated steam locomotive, it will not produce an indicator diagram showing a higher mean effective pressure than the saturated steam engine. In many cases the mean effective pressure of the superheater locomotive will even be somewhat lower than in the saturated steam locomotive, on account of the expansion line of superheated steam dropping faster than the expansion line of saturated steam. If, therefore, the superheater engine and the saturated steam engine are working under identical conditions and have identical dimensions, the superheater engine cannot develop more drawbar pull than the saturated steam engine. If a larger tractive effort at a certain speed is required, either the cylinders of the superheater engine must be increased or the engine has to be worked at larger cut-offs, which again is made possible by the increased steaming capacity of the boiler. It is also evident that without changing the size of the cylinders or the boiler pressure, the superheater engine cannot start a heavier train load than the saturated steam engine.

"On saturated steam engines in many cases the size of cylinders is limited on account of fear of condensation. The superheater engine is not subject to such limitations and, therefore, allows in many cases a better use of the available adhesive weight. In order to increase the starting power, under average conditions, it will be advisable to increase the diameter of the cylinders of superheater engines 10 per cent. above the size of the cylinders of the saturated engine. This will not only correspondingly increase the starting power, but at the same time will make possible the use of the increased steaming capacity of the boiler, without unduly increasing the cut-off of the engine, and in many cases will allow the superheater engine to work with lower boiler pressures.

"Mr. Beyer has shown that locomotives of large capacity are more economical in operation than smaller units. He particularly cited the case of large superheater mikado locomotives which haul trains of 45 and 50 per cent. greater tonnage with the same amount of coal that was consumed by the consolidation locomotives they replaced. In order to develop the specified tractive effort these mikado locomotives had to be equipped with cylinders of 27 in. diameter. What would have become of these poor engines with these big cylinders without the superheater! The cylinder condensation would have been so large as to make the operation of the engines a practical impossibility. There is no other means existing to entirely prevent cylinder condensation but superheaters, and superheating has made the most powerful locomotives with big cylinders possible.

"On Mallet engines built during the last two years superheaters have been quite generally applied, as the large surface to which the steam is exposed in the four cylinders and long steam pipes makes the application of this device even more necessary than in ordinary simple engines in order to prevent the increased amount of condensation. In most cases the superheater has been applied in front of the high pressure cylinder

and the steam has been superheated sufficiently high to leave at least 30 or 50 deg. of superheat in the receiver steam. This remaining superheat makes it possible to use slide valves on the low pressure side; high pressure cylinders using steam of a high degree superheat cannot successfully be worked with slide valves.

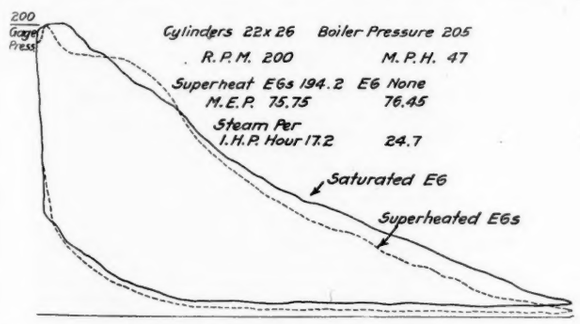
"Repeated tests have been carried on particularly with a view of applying superheaters to old engines with slide valves, and in all cases which have come to my knowledge it has been found that slide valves cannot be worked successfully with highly superheated steam. Various means have been developed in order to improve the lubrication of the slide valves, but so far all have failed, because highly superheated steam has a tendency to warp the flat valve, which is the principal cause for the rapid wear of its bearing surfaces.

"Regarding the lubrication of piston valve superheater engines, great fear has been expressed as to the difficulties to be expected in this respect, but a great number of superheater locomotives now in satisfactory service, and causing no more wear on piston and piston valve rings and bushings than saturated steam locomotives, indicate that this question can be successfully solved. Two points, however, should be borne in mind in this connection, i. e., that superheater locomotives, working with highly superheated steam, should be lubricated with a cylinder oil having a higher flash point than the ordinary cylinder oil used in saturated steam locomotives, but without losing its lubricating qualities, and further means should be provided to protect the oil against carbonization while the engine is drifting, that is, working without steam. This protection can be obtained by the admission of small quantities of steam to the steam chest and cylinders, while the engine is drifting after the throttle is closed. This auxiliary steam can be supplied either by cracking the throttle or by providing an auxiliary steam pipe to the cylinders. The latter can be worked by an auxiliary valve in the cab actuated either by hand or automatically.

"In addition to these means of improving the lubrication, it is essential to design all parts working under highly superheated steam so as to cause the least amount of friction and wear. This is being done by using the best quality of close grained iron for bushings and rings and by balancing the rings against inside steam pressures and by the application of piston valve rod guides, and piston rod guides at the front end, in order to reduce the weight pressing the rings against the bushings."

C. D. YOUNG ON ADVANTAGES OF SUPERHEAT AS SHOWN BY THE INDICATOR CARDS.

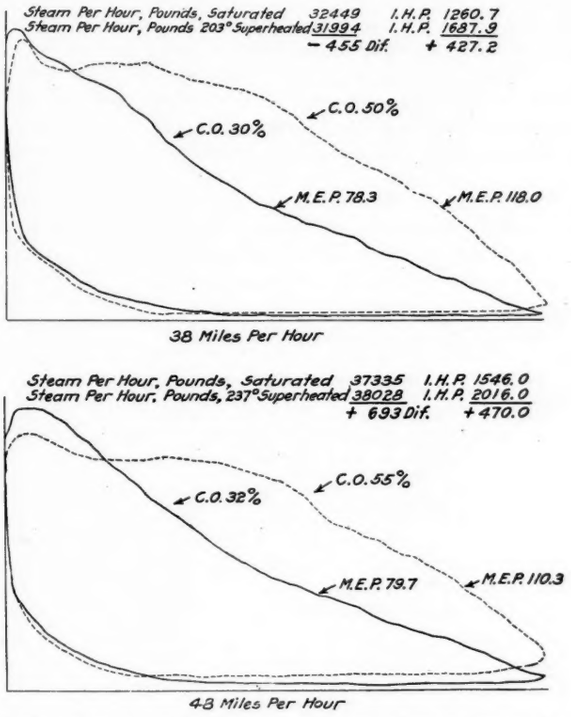
C. D. Young, engineer of tests of the Pennsylvania Railroad, presented indicator diagrams for both saturated and superheated steam locomotives, which clearly show the advantages



Indicator Cards for Saturated and Superheated Steam Locomotives Working Under the Same Condition as to Cut-off, etc.

of the latter. It is believed that this is the first time that a comparison of this sort has been made. One set of indicator diagrams was for an Atlantic type locomotive with 22 in. x 26 in. cylinders, 205 lbs. of steam, and operating at 47 miles an hour with 200 deg. of superheat. This was compared with the diagram of a saturated steam engine with practically the same cut-off and under the same conditions. As may be seen from the diagrams, the card for the superheater engine showed a steam consumption of 17.2 lbs. per indicated horse power per hour, as compared to 24.7 lbs. for the saturated steam engine.

The other illustrations show saturated and superheated steam


Steam Per Hour, Pounds, Saturated 32449 I.H.P. 1260.7
Steam Per Hour, Pounds 203° Superheated 31994 I.H.P. 1687.9
- 455 Dif. + 427.2
C.O. 50%
C.O. 30%
M.E.P. 78.3
M.E.P. 118.0
38 Miles Per Hour
Steam Per Hour, Pounds, Saturated 37335 I.H.P. 1546.0
Steam Per Hour, Pounds, 237° Superheated 38028 I.H.P. 2016.0
+ 693 Dif. + 470.0
C.O. 55%
C.O. 32%
M.E.P. 79.7
M.E.P. 110.3
48 Miles Per Hour

Indicator Cards for Saturated and Superheated Steam Locomotives for Equal Weights of Steam Per Hour.

indicator cards for equal weights of steam per hour when operating under the same condition. In both cases the greater indicated horse power for the superheater engine is most noticeable.

WISCONSIN COMMISSION ON LOCOMOTIVE HEADLIGHTS.

The Railroad Commission of Wisconsin has, as a result of investigations* into the qualifications of certain types of headlights, has issued an opinion as to which of the lights tested comply with Section 1809 V of the Laws of 1911. This law specifies that the locomotives operated on railways in Wisconsin having a length of more than 50 miles must be equipped with headlights of sufficient illuminating capacity to allow the engineman to distinctly discern an object the size of a man at a distance of 800 ft. An abstract of the decision follows:

In accordance with the desires of various railways operating in Wisconsin the railroad commission made a thorough investigation of the following headlights:

Standard type oil headlight with 16 in. case.
Bunn Safety oil headlight with 16 in. lens.
Bunn Safety oil headlight with 18 in. lens.
Commercial acetylene headlight with 18 in. reflector.
Commercial acetylene headlight with 27 in. reflector.
Pyle National electric arc headlight.
American electric arc headlight.

The efficiency of the various headlights with respect to visibility of objects on the track and to signal and switch lights was observed in a number of road tests, at which a large proportion of the observers were practical railroad men in the employ of the various railroads in the state. Later observations were taken

*A report of some of these investigations was presented before the October meeting of the Western Railway Club and abstracted in the *Railway Age Gazette* October 18, page 732.

by the commission's staff from the cab of engines in regular service and while on their regular runs.

Following is a brief statement of the results of the studies made of the various lights:

Oil Headlight.—Observations made at the road tests together with those made in actual operation, indicate that none of the oil headlights fulfill the requirements of the law.

Commercial Acetylene Headlight.—Observations on the headlight of this type having a 27 in. reflector were not conclusive, as the reflector was defective. The observations made on that having the 18 in. reflector would appear to indicate that the acetylene headlight equipped with a cluster of three burners, each having a capacity of one-half cubic foot of gas per hour and having the 18 in. reflector fulfills the provisions of the law. An acetylene light in regular service having a double burner and a reflector that had been poorly maintained did not give satisfactory results, while another in regular service having the double burner and a well polished reflector was much more satisfactory. It is believed that it will be necessary to maintain the reflector in a high degree of efficiency and to use the cluster of three burners in order to obtain satisfactory results with this type of light.

Pyle-National and American Electric Headlight.—Observations both at the road tests and in regular service indicate that the electric arc headlights fulfill the requirements of the law. There are some features, however, connected with the operation of arc headlights on locomotives which should not pass unnoticed. The following items should be considered:

Liability of reflected light from the roundels of signals whose lights have become extinguished or have burned low, being mistaken for a clear indication.

Difficulty of distinguishing classification lights and engine numbers on locomotives equipped with arc headlights.

Dazzling effect on yardmen, flagmen and others who are required to perform their duties in the rays of these strong headlights.

As for the first item, observations made by the commission's staff on electric headlights in actual service with the engine moving continuously at usual speeds, demonstrate the fact that dangers from this source are not nearly so great as were indicated by the earlier tests at which the observers were invariably stationary while the readings were being taken. While numerous phantom lights were detected in the regular service tests, they were not of such a nature as to cause serious confusion to the trainmen. It was also found that the position of the blades become visible, in general, before the phantom lights are seen, and that these phantom lights are much in the nature of mere flashes when the engine is running at the usual speeds.

As for the second item, it is believed that some precautions should be taken to place classification lights and engine numbers at such a distance from the headlight that the latter may not materially interfere with correct reading of them.

As for the third item, it is believed that the arc lights should be switched off while the train is passing through large yards as well as at other points when it may have a tendency to interfere with the performance of duty by yardmen, flagmen, etc., or to endanger their lives. An incandescent lamp should then be switched on whose illuminating capacity is sufficient to act as a marker for the engine and give warning of its approach. This means should also be employed on engines carrying colors when it is necessary that the fact be made known to the crew of another train or to other interested parties. It can also be used in case there is any confusion of signal lights resulting from the high power of the headlight. It is believed, however, that the electric headlight does not endanger the operation of trains either on single or double track, provided precautions such as those above outlined are observed.

It should be stated that the investigations made are not conclusive with respect to the use of the electric arc headlight on roads equipped with the disc type of signal. A brilliant reflection is cast by this light from a plain glass surface of the size used in front of the large disc for day indications. The small disc for night indications is located a few inches above this large glass surface and it is possible that the brilliant reflection from the latter may interfere with the correct reading of the night indications. The lack of blades to serve as a check is another feature which differentiates this signal from the semaphore type. Careful tests should be made to determine this point before the attempt is made to operate electric arc headlights on a road thus equipped.

It should be borne in mind that these investigations have covered only the headlights named herein, though from some inconclusive observations it would appear that there are other types of power headlights now on the market that may be expected to give good results, both as to illuminating capacity and freedom from objections as regards the safety of train operation. There are also other makes of arc headlights which probably compare favorably with the two investigated, and to which the same objections might be raised as those above enumerated.

RAILROADS AND NEW PARCEL POST LAW.

The committee on railway mail pay, of which Ralph Peters is chairman, has issued a statement showing arrangements in foreign countries for compensating railroads where a parcel post is now in operation as a basis of their claim that the railroads will be grossly underpaid under the new parcel post law.

The committee's statement is in part as follows:

"It is not generally known by the public that when the last session of Congress passed a law for the establishment of the parcel post in the United States to take effect January 1, 1913, it failed to make any special provision for payment to the railway companies for transporting this new class of traffic. Congress appointed a joint Commission of the House and Senate to consider the case of mail transportation, but the commission has not as yet convened and a period of less than four weeks intervenes before the new traffic will begin to move.

"In many of the European countries, where the parcel post is operated, the railroads are largely owned by the respective governments, but even in these cases there seems to be a provision for accounting for the traffic so as at least to cover the cost of performing the service of transportation. The only foreign country in which the general conditions closely approximate those of the United States is Great Britain, where the same system of jurisprudence prevails and where the railways are of private ownership. Here the arrangement for many years has been to pay the railways 55 per cent. of the total postage on all parcels mailed. The amount of the postal revenues represented by 55 per cent. is paid over to the London Railway Clearing Committee, which apportions the amount to the several railroads in the ratio of their other parcel business which is not carried in the mails. This is a higher percentage than has been usually adopted in the agreements in the United States between express companies and the railroads over which they operate—the average payment to railway companies by express companies is about 47 per cent. of the express charges to the public.

"In France the railway systems aggregate 30,186 miles and are almost entirely of private ownership. The railways operate the parcel post service under the general supervision of the government and collect the charges, paying the government 2 cents per parcel regardless of the weight. Hence up to 6.6 pounds they retain 10 cents out of every 12 cents, or 83 per cent., and for heavier parcels up to 11 pounds they retain 14 cents out of 16 cents, or 81½ per cent. When the railway charters were renewed in 1890 the government agreed to guarantee to the principal companies a minimum rate of 3 per cent. interest on the stock and bonds, thus contributing a subsidy of from $8,000,000 to $15,000,000 yearly and in return secure reduced rates for the transportation of soldiers and military equipment, etc.

"In Germany, where there are 37,338 miles of railway, the roads are mostly owned by the individual States, but are operated under the supervision of the Imperial Railway Administration. They carry one postal car on any train without charge

to the Postal Administration, but any additional cars that are required and for all parcel traffic exceeding 22 pounds in weight compensation is credited to the Railway Administration, covering approximately the cost of performing the service.

"In Austria, where there are 17,432 miles of railway, the government owns about one-half. The Postal Department pays the Railway Department for parcel post traffic on the government owned lines 50 per cent. of the expenses incurred.

The statement shows that the railroads of Italy, the Netherlands, Belgium, Denmark and Switzerland are well paid for this service and goes on to say:

"In the absence of any action by Congress to remedy the situation, the parcel post matter, if added to the mails now carried by the railroads, would only be weighed once in four years and the pay would not be readjusted any more frequently.

"At present, 11 packages weighing serially 1 to 11 lbs., or a total of 66 lbs., if sent by express in the first zone (50 miles), would bear express charges of $3.05. The railroad's share, on the basis of 47 per cent., would be $1.43, while the express company would retain $1.62.

"Under the new parcel post law, the same packages would pay the government a postage of $2.20, out of which the railroads would be paid 13 cents and the Post Office Department would retain $2.07. The railroad pay is computed on the current rate of about 8 cents per ton mile.

"According to the rate of 55 per cent. allowed the railways in Great Britain, the railways' share of the $2.20 postage charge would be $1.21, as against only 13 cents in the United States.

"Criticism is being made that the proposed parcel post rates for extreme distances, such as between the Atlantic and Pacific coasts, are flat 12 cents a pound, or $1.32 for an 11 lb. package, in contrast with the rate from Great Britain to any point in the United States of 3s. 3d., or 79 cents, for an 11 lb. package.

"Senator Bourne, in preparing the rates for the new parcel post, effective January 1, 1913, expressed the conviction that the government may suffer a slight loss in connection with long distance parcels even at the rate of 12 cents a pound, but concluded that only 13 per cent. of the existing fourth-class mail matter was carried such long distances; and, assuming that the parcel post matter would be in the same proportion, he did not anticipate a very heavy loss in the aggregate, but was willing to try the rate experimentally.

"In the case of Great Britain, that country provides for packages coming to the United States a water haul of about 3,000 miles, but depends upon the United States to make the land haul of about the same distance, although the latter is much more expensive than the water haul.

"No doubt the United States is very generous in permitting this arrangement, inasmuch as it requires its citizens to pay 12 cents a pound on all parcels going to foreign countries, including Great Britain.

"It is true that the amount of business involved is not very large; the reports for the year ended June 30, 1910, showed that the United States received from Great Britain 115,755 parcels, weighing 466,790 lbs., or an average of 4 pounds per parcel, and received from all foreign countries, including Great Britain, 359,219 parcels, weighing 1,680,724 lbs., or 4.6 lbs. per parcel. Dividing the number of parcels by 365 days, we find a daily average of 317 parcels a day from Great Britain and 984 a day from all foreign countries. It is well known that about one-third of all of these parcels are addressed to New York City or vicinity, and it, therefore, seems reasonable that not more than 10 or 15 per cent. would be for long distance transmission across the country, or, say, 100 to 150 parcels a day.

"In view of Senator Bourne's calculation that the rate of 12 cents a pound would not surely reimburse the Post Office Department for the service performed, it would seem that the proper remedy would be *not* for the United States Government to reduce its charge, but rather to collect an additional charge on packages or parcels coming from abroad, so as to recover the deficiency in the rate."

General News.

John N. Stroud, traveling passenger agent of the Chicago, Rock Island & Pacific, has been elected president of the Railroad Club of Kansas City, succeeding L. L. Chipman, resigned. Mr. Stroud's place as vice-president was filled by J. C. Finch, and A. J. Stewart, purchasing agent of the Kansas City Terminal Railway, was elected junior vice-president.

The lower House of Congress on December 5 passed with but little debate the bill of Representative Adamson, providing for physical valuation of the railways of the country under the direction of the Interstate Commerce Commission. This action of the House is understood to have been designed largely for the political effect, and it is not expected that the Senate will pass the bill.

The New York Chamber of Commerce has adopted resolutions appreciative of the work of the recent board of arbitration on enginemen's wages, and expresses the hope that Congress will enact laws to make effective the recommendation that a commission be established with authority to adjust industrial disputes between employers and employees engaged in interstate commerce.

The Chicago, Burlington & Quincy has just paid the State of Illinois a fee of $110,885 for an extension of the road's charter for fifty years. Attorneys for the company contend that it is operating under a perpetual charter, but to be on the safe side it was decided to take advantage of a recent act of the legislature giving corporations the privilege of extending their charters for fifty years.

The result of the physical valuation which the Lehigh Valley has been carrying on for nearly a year is to put a value of $300,000,000 on the company's property used for transportation and exclusive of the coal lands and collieries. Lehigh Valley has a total secured debt of $86,500,000. It also pays considerable annual rentals, in the form of guaranteed interest and dividends on securities of subsidiaries or otherwise. Capitalizing these at 4½ per cent., they amount to $54,200,000 and make the total debt ahead of the stock $140,700,000. Deducting this from the $300,000,000 valuation gives $159,300,000 for the stockholders, or a percentage value of 263 for the shares.

A. B. Apperson, general superintendent, and N. A. Williams, superintendent, of the Denver & Rio Grande, recently rose to an emergency by demonstrating that they had not forgotten their early training in railroading. These officers, with others, were returning to Salt Lake City in a special train after an inspection trip, and when they reached Midvale, 17 miles from Salt Lake City, the record showed that the fireman and engineman had been on duty 16 hours. Rather than wait for another train or a new crew, Mr. Apperson donned the engineer's overalls and took charge of the throttle, while Superintendent Williams took the fireman's scoop. The run to Salt Lake City was made without incident, the regular engineman and fireman riding in the superintendent's car.

Pure Water and Ice.

Arrangements have been made by the Chicago, Burlington & Quincy to send Dr. D. J. Evans, medical examiner of the company, over the lines of the system for the purpose of inspecting water and ice used in passenger coaches, dining cars and station restaurants. He will also make an investigation into the sanitary conditions at various stations. Medical examiners in all districts on the Burlington lines have been instructed to investigate the source of supply of water and ice used.

Strike on the North Eastern of England.

Press despatches of December 7 reported an extensive strike of the locomotive engineers of the North Eastern of England, because one of the engineers engaged on the main line, owing to a conviction for drunkenness while off duty, was reduced to running a pilot engine. The punished man had been promised that if his future conduct were good he would be reinstated in his old position, but the locomotive engineers' union demanded his immediate reinstatement, and as this was not granted by the company the men were called out. Three thousand of the engineers

quit work the first day, and by Tuesday, the 10th, complete paralysis of industrial life and a coal famine were threatened. Many industrial plants were compelled to close because of lack of fuel, and numerous collieries were shut down because the output could not be carried away. On Tuesday at noon it was estimated that 12,000 men were idle. The North Eastern line was completely disorganized.

Common Towels Forbidden.

"The common towel is wiped out." This is the heading of a press despatch this week announcing that the Secretary of the Treasury, following his recent order forbidding the use of common drinking cups on railroad cars and on vessels, and also in stations of interstate transportation lines, has issued a similar order relative to the use of towels. Towels in these public places may be used a second time only after having been sterilized in boiling water.

Louisville & Nashville and the Western Union.

The Louisville & Nashville was ready to install telegraph and telephone lines on its road on December 1, 1912. The company says that the Western Union on August 11, 1911, gave notice that the contract between the two companies would be terminated on August 17, 1912. The Western Union began condemnation proceedings in Alabama looking to the erection of telephone lines on the right-of-way of the L. & N., and the South & North Alabama. The railroad company took the matter to the courts in an attempt to prevent such condemnation proceedings, and one case is now before the Alabama Supreme Court, the lower courts having decided in favor of the railroad company. The Western Union has secured a temporary injunction restraining the railroad company from interfering with the telegraph lines now standing on its right-of-way.

"Safety First" Rally at Buffalo.

A "Safety First" rally is to be held in Buffalo on December 17, for the purpose of advancing the cause of safety on all the roads running into that city. Officers and employees of the New York Central, Lake Shore, Michigan Central, Pennsylvania, Delaware, Lackawanna & Western, Lehigh Valley, Wabash and the Toronto, Hamilton & Buffalo are expected to attend in large numbers. A circular addressed to the employees reads in part as follows: "You will be entertained—that's worth something. You will gain information for your own protection—that's worth more." For the convenience of those desiring to attend, special trains will be run, or additional facilities provided on regular trains, from Rochester, Suspension Bridge, Erie, Manchester, Hamilton, Olean, Oil City, Mount Morris and Welland. The rally will be held at Elmwood Music Hall, on Elmwood avenue and Virginia street, and will begin at 8 o'clock p. m. J. G. Rodgers, general superintendent of the Pennsylvania, will be chairman; and the program includes short addresses by P. E. Crowley, general manager of the New York Central & Hudson River; T. E. Clarke, assistant to the president, Delaware, Lackawanna & Western; C. L. Bardo, assistant to the general manager, Lehigh Valley; D. R. MacBain, superintendent motive power, Lake Shore, and George Bradshaw, general safety agent, New York Central Lines. Mr. Bradshaw's address will be illustrated with stereopticon views. Following the addresses there will be five-minute talks upon the subject, "The Part of the Employee in the Campaign for Greater Safety." The speakers on this topic will include Lorenzo J. Ward, engineman, New York Central; W. T. M. Shannon, engineman, Pennsylvania R. R.; L. M. Newton, freight conductor, Lake Shore; John J. Scott, Sr., engineer, Lehigh Valley, and W. J. Welch, trainman, Delaware, Lackawanna & Western. Music will be furnished by the Lehigh Valley shop band.

A European Authority on the Bureau of Railway Economics.

Dr. A. von der Leyen, former director of railways in the Prussian Ministry of Public Works, counsellor of state in Prussia, and editor of the *Archiv für Eisenbahnwesen,* which is the official journal of the Prusisan Ministry of Public Works, has contributed to the publication mentioned a review of the "Catalogue of Books on Railway Economics," recently issued by the Bureau of Railway Economics, in which he makes some interesting comments on the bureau and its work. In the course of his review, Dr. von der Leyen's comments upon the functions of and the work done by the bureau are so good a statement, and the statements are at once so interesting, accurate and comprehensive, that they are quoted in part below.

"During recent years in the United States of America there has been much investigation and discussion of railways on their economic side. The causes for this are to be found in the unsatisfactory conditions in railway affairs, rates, financial management, relations with employees, etc., and also in the repeated attempts which have been made to improve recognized evils by means of federal and state laws. In all this discussion one thing was felt to be more and more needed. Although there are many thoroughly trained men in the United States who are engaged in railway matters, men educated in both practice and theory, a deep knowledge of the inner meaning of railway affairs is lacking among the people and in the legislative bodies. Even the great railway systems and their heads manage chiefly according to their own experience and according to custom, not according to general fundamental principles. Moreover, there has been lack of an exact knowledge of the railways of other countries, and therefore of the possibility of making comparisons and conclusions from foreign experience to aid in handling the home railways.

"These needs were considered at a meeting of railway presidents in the spring of 1910. To meet them it was decided to create a new organization, which should have for its object the investigation of the economic situation of the railroads of the United States and of other countries and should make the results of its investigations broadly accessible. For this purpose a bureau was established under the name "The Bureau of Railway Economics," which was opened on the first of August, 1910, and can thus look back now on an activity of more than two years. The presidents of six of the largest railway systems are members of the committee and the managing director is Logan G. McPherson, a specialist in railway affairs, well known to readers of this journal, and extremely well trained in both practical and theoretical lines. At the head of the statistical department is Frank Haigh Dixon, a specialist also well known to us through numerous works, statistical and otherwise; and Richard H. Johnston, recently of the Library of Congress, is librarian. The bureau is situated in Washington. Its duty has been to keep in close touch with the Interstate Commerce Commission, and also to work over the publications of that commission and make the results clear to the widest circles.

"The bureau began its work immediately after opening. It publishes monthly statistics of American railways based on the monthly reports filed by the railways with the Interstate Commerce Commission, and has published a number of monographs, some of them most valuable. In some of these, strictly American conditions are treated and in others comparisons between American and other railways are drawn up from a strictly scientific point of view. The newest and most comprehensive publication is a catalog of the literature on the economic side of railway affairs."

That the reputation of the bureau is extending throughout the world is illustrated by the fact that it has recently received a request for its publications from Jujiro Ito of Waseda University, Tokio, Japan, who states that the documents are intended for use both in connection with transportation seminary work and lectures on transportation at Waseda University.

The Troubles of the New York, New Haven & Hartford.

News concerning the grievances of the people of New England against the New York, New Haven & Hartford has appeared in all of the eastern papers daily during the past week, the size of the display headlines being often in inverse ratio to the value of the news.

Lawyer Brandeis, of Boston, proposes that the state of Massachusetts buy both the New Haven road and the Boston & Maine as the only way to cure the evils of the present monopoly. Two members of the legislature of that state who introduced bills for such purchase in the last session intend to renew them in the next legislature. A similar bill has been drafted in New Hampshire for presentation to the legislature of that state. The Massachusetts legislature will be asked to dissolve the Boston Railroad Holding Company, the company by which the New

Haven controls the Boston & Maine; and at the same time will be asked to buy the Boston & Albany. In Connecticut a number of bills have been introduced in the legislature to more closely regulate the electric railways of that state, which are controlled by the New Haven.

The governor of Rhode Island, the mayor of Providence, and other citizens of that state have filed a petition at Boston, asking authority to form a Massachusetts corporation to acquire and complete the Southern New England Railroad, the line from Palmer to Providence on which the Grand Trunk has suspended work.

On Monday of this week it was announced in Providence that contractors who had done work on the Southern New England were taking action which seemed to look like a resumption of operations. When the president of the Grand Trunk was asked in New York City if work was ever to be resumed on the Southern New England, he replied: "Of course."

A member of the Connecticut legislature announces that he will start an investigation of the New Haven road at the coming session.

The proposition of Congressman O'Shaunessy, of Rhode Island, that the House of Representatives shall appoint an investigating committee was the subject of public hearings by the Committee on Rules in Washington on Tuesday and Wednesday. Many representatives of New England interests were heard, and the whole list of complaints was rehearsed.

The federal grand jury at New York has continued its investigation of the affairs of the New Haven road. Among those who have testified are T. E. Byrnes and B. Campbell, vice-presidents of the road; Mr. Warner, one of the directors, and A. E. Clark, secretary of the company; Vice-president J. E. Dalrymple, of the Grand Trunk; Mr. Murdock, vice-president of the Southern New England; Vice-president E. H. Fitzhugh, of the Grand Trunk, and F. J. McLeod, of the Massachusetts Railroad Commission. President Mellen, of the New Haven road, wrote to the district attorney asking the privilege of testifying, and waiving any privilege of immunity which he might have because of testifying. Mr. Mellen said that he himself was the only person connected with the New Haven road who had taken any part in negotiations with the Grand Trunk, or who was present at such negotiations.

The Interstate Commerce Commission has had accountants in New Haven for some weeks past examining the books of the New Haven road.

The state's attorney at Bridgeport, Conn., announces that he is going to begin criminal action against the officers of the New Haven road on account of the derailment at Westport, October 3; but he will not name the officers whom he intends to prosecute.

On Saturday, last, President Chamberlin, of the Grand Trunk, announced that the tentative draft of a traffic agreement which had been sent to the Grand Trunk by the New Haven was not satisfactory and that he probably would submit a counter-proposition; but probably not for a month or two.

In the federal court at Trenton, N. J., last week, Miss Jennie Morse, a sister of Charles W. Morse, filed a suit alleging that the New York, New Haven & Hartford had illegally manipulated the affairs of the Metropolitan Steamship Company. She asked the court to annul the transactions of the New Haven company in connection with the steamship company and to order the steamers Yale and Harvard returned from the Pacific coast.

One of the answers of the New Haven road to the newspaper criticisms of its management was shown in the *Railway Age Gazette* last week, in the shape of an advertisement calling attention to the successful conduct of the heavy passenger traffic incident to the New Haven football games. This week an advertisement, in still larger type, headed "The Truth, No. 1," has appeared in prominent newspapers, calling attention to the report of Chief Engineer Elwell of the Connecticut Commission, on the derailment at Greens Farms, November 15, in which it is shown that the defective equalizer bar was in such a position that no ordinary inspection could have detected its weakness. This advertisement, signed by Charles S. Mellen, president, says that "thousands of newspaper columns, under glaring headlines, have blazed with the news of this wreck, which was beyond any preconceived human foresight"; and the advertisement is an answer to the action of the newspapers and to the "columns of heartless caricature and political denunciation directed against the whole system." Mr. Mellen declares that the main line between New York and Boston is "still unsurpassed in solidity of construction and general safety by any main line of any railroad system in the United States."

The Public Service Commission of the state of New Hampshire in compliance with an order of the legislature has made a special report on freight rates in that state, with particular reference to the Boston & Maine. Two years ago the B. & M. asked for the repeal of a law of 1883 limiting freight rates on that road. This law is included in legislative acts authorizing certain leases of smaller roads, and it appears that the rate limitation has been violated.

The report fills 350 pages. The commission has considered three possible solutions of the present difficulty. (1) To repeal the restrictive laws of 1883 and 1889. In doing this the state would surrender in large part its authority to regulate rates. (2) The legislature might take no action and leave it to the executive department of the government to enforce the present law. This, however, would probably lead to no good result, and so the commission recommends, in the third place, that the legislature, directly or through the commission, investigate the general subject of rates and then prescribe rational and fair tariffs for the whole state. Under the present situation, however, this course could not be taken except with the assent of the railroad. If the road should not agree to this course, the state could do nothing but enforce the old laws.

The foregoing is the substance of the recommendations as published in the newspapers, on information given out by the officers of the state. The officers of the road, however, call attention to other parts of the report, in which the commission says that the control of the B. & M. by the New York, New Haven & Hartford has not made any change unfavorable to the public, in the arrangement of freight rates, nor has the Boston & Maine suffered any diminution of revenues. And in regard to purchases of coal and other commodities, the commission finds that the terms and prices of the contracts made for these supplies were favorable to the road.

On Wednesday testimony was given before the grand jury in New York City, by M. K. Dugan, private secretary of President Mellen, and N. Kensella, private secretary to President Chamberlin, of the Grand Trunk.

At the hearing before the Congressional committee in Washington on Wednesday, Vice-president E. G. Buckland, of the New Haven, presented a detailed explanation of those features of the railroad company's policy and management which have been the subject of the recent criticisms. He explained the causes of the derailments. The electric railways were acquired to give a service complementary to the service to the steam roads; these lines are not properly interurbans, like the trolley roads in the Middle West. The New Haven road came into possession of its principal steamship lines because they belonged to the short Massachusetts railroads which it aborbed many year ago. Those roads had to have the steamships to gain entrance into New York City. Freight rates are now lower by the water lines than by rail, and so are passenger fares; and in the matter of freight the boats are more expeditious and convenient in many cases.

Mr. Buckland presented to the committee a copy of the draft of an agreement which had been sent by Mr. Mellen to the Grand Trunk, but which had not been signed by the G. T. The contract provides that the New Haven shall open to joint rates, and through billing in connection with the Grand Trunk's lines, all its stations, the division of such joint rates to be arbitrated, if the roads cannot agree, the arbitrator is to be selected by the chairman of the Interstate Commerce Commission. The points of interchange for the joint business contemplated is to be White River Junction, Vt.

The agreement contemplates the running of through trains, through cars, the selling of through tickets, the checking of through baggage, and the through billing of freight. The meeting of competitive conditions and the maintenance of the present differential basis of rates now accorded to the Grand Trunk, is assured.

The Grand Trunk is to grant to the New Haven the joint and equal use of the following lines: Between White River Junc-

tion and Windsor, Vt.; Swanton and Alburgh, Vt., so that the Saint Johnsbury & Lake Champlain may have an unbroken line in connection with the Rutland Railroad; Rouses Point, and Montreal, so that Rutland may have an unbroken line to Montreal when the Rutland Railroad's present arrangement for reaching Montreal terminates.

The New Haven is to grant to the Grand Trunk the use of the line between Windsor, Vt., and Brattleboro.

In the making of the detailed agreements covering the joint and equal use of each other's lines an arbitrator is to be selected, if necessary, by the Governor-General of Canada.

Chicago Transportation Association.

At a meeting of the Chicago Transportation Association held on December 2 the following officers were elected: President, Ray F. Clark, Canadian Northern Railway; vice-president, O. T. Lindrooth, National Fireproofing Company; second vice-president, A. D. Davis, Universal Shipping Company; third vice-president, T. G. McGill, Denver & Rio Grande Railroad; secretary, H. E. Macniven, Joseph Stockton Transfer Company; treasurer, J. W. Betts, New York Central Lines; financial secretary, George H. Brown, Grand Trunk Railway.

Traffic Club of St. Louis.

The annual dinner of the Traffic Club of St. Louis was held at the Mercantile Club in that city on the evening of December 4. The speakers and their subjects were as follows: B. A. Worthington, president of the Chicago & Alton, "Railroad Problems"; Edwin G. Gooley, educational adviser, Chicago Commercial Club, "Vocational Education"; A. A. Young, professor of economics, Washington University, "Relation of Railway Rates to the Advance in Prices."

MEETINGS AND CONVENTIONS.

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

Air Brake Association.—F. M. Nellis, 53 State St., Boston, Mass. Convention, May 6-9, St. Louis, Mo.

American Association of Demurrage Officers.—A. G. Thomason, Boston, Mass.

American Association of General Passenger and Ticket Agents.—W. C. Hope, New York.

American Association of Freight Agents.—R. O. Wells, East St. Louis, Ill. Annual meeting, June 17-20, Buffalo, N. Y.

American Association of Railroad Superintendents.—E. H. Harman, St. Louis, Mo.; 3d Friday of March and September.

American Electric Railway Association.—H. C. Donecker, 29 W. 39th St., New York.

American Electrical Railway Manufacturers' Assoc.—George Keegan, 165 Broadway, New York. Meetings with Am. Elec, Ry. Assoc.

American Railway Association.—W. F. Allen, 75 Church St., New York. Next meteing, May 21, New York.

American Railway Bridge and Building Association.—C. A. Lichty, C. & N. W., Chicago. Convention, October 21-23, 1913, Montreal.

American Railway Engineering Association.—E. H. Fritch, 900 S. Michigan Ave., Chicago. Convention, March 18-20, 1913, Chicago.

American Railway Master Mechanics' Association.—J. W. Taylor, Old Colony building, Chicago. Convention, June 11-13, Atlantic City, N. J.

American Railway Tool Foremen's Association.—A. R. Davis, Central of Georgia, Macon, Ga.

American Society for Testing Materials.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa.; annual, June, 1913.

American Society of Civil Engineers.—C. W. Hunt, 220 W. 57th St., New York; 1st and 3d Wed., except June and August, New York.

American Society of Engineering Contractors.—J. R. Wemlinger, 13 Park Row, New York; 2d Tuesday of each month, New York.

American Society of Mechanical Engineers.—Calvin W. Rice, 29 W. 39th St., New York.

American Wood Preservers' Association.—F. J. Angier, B. & O., Baltimore, Md. Convention, January 21-23, Chicago.

Association of American Railway Accounting Officers.—C. G. Phillips, 143 Dearborn St., Chicago. Annual meeting, May 28, Atlantic City, N. J.

Association of Railway Claim Agents.—J. R. McSherry, C. & E. I., Chicago.

Association of Railway Electrical Engineers.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago. Semi-annual meeting, June, 1913, Atlantic City, N. J.

Association of Railway Telegraph Superintendents.—P. W. Drew, 112 West Adams St., Chicago; annual, May 20, 1913, St. Louis, Mo.

Association of Transportation and Car Accounting Officers.—G. P. Conard, 75 Church St., New York.

Bridge and Building Supply Men's Association.—H. A. Neally, Joseph Dixon Crucible Co., Jersey City, N. J. Meeting with American Railway Bridge and Building Association.

Canadian Railway Club.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and Aug., Montreal.

Canadian Society of Civil Engineers.—Clement H. McLeod, 413 Dorchester St., Montreal, Que.; Thursdays, Montreal.

Car Foremen's Association of Chicago.—Aaron Kline, 841 North 50th Court, Chicago; 2d Monday in month, Chicago.

Central Railway Club.—H. D. Vought, 95 Liberty St., New York; 2d Thurs. in Jan. and 2d Fri. in March, May, Sept., Nov., Buffalo, N. Y.

Civil Engineers' Society of St. Paul.—L. S. Pomeroy, Old State Capitol building, St. Paul, Minn.; 2d Monday, except June, July, August and September, St. Paul.

Engineers' Society of Pennsylvania.—E. R. Dasher, Box 704, Harrisburg, Pa.; 1st Monday after 2d Saturday, Harrisburg. Pa.

Engineers' Society of Western Pennsylvania.—E. K. Hiles, 803 Fulton building, Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

Freight Claim Association.—Warren P. Taylor, Richmond, Va. Next convention, June 18, Bluff Point, N. Y.

General Superintendents' Association of Chicago.—E. S. Koller, 226 W. Adams St., Chicago; Wed. preceding 3d Thurs., Chicago.

International Railway Congress.—Executive Committee, 11, rue de Louvain, Brussels, Belgium. Convention, 1915, Berlin.

International Railway Fuel Association.—C. G. Hall, 922 McCormick building, Chicago. Annual meeting, May, 1913, Chicago.

International Railway General Foremen's Association.—Wm. Hall, Chicago & North Western, Escanaba, Mich.

International Railroad Master Blacksmiths' Association.—A. L. Woodworth, Lima, Ohio. Annual meeting, August 18, Richmond, Va.

Maintenance of Way Master Painters' Association of the United States and Canada.—W. G. Wilson, Lehigh Valley, Easton, Pa.

Master Boiler Makers' Association.—Harry D. Vought, 95 Liberty St., New York. Convention, May 26-29, 1913, Chicago.

Master Car Builders' Association.—J. W. Taylor, Old Colony building, Chicago. Convention, June 16-18, Atlantic City, N. J.

Master Car and Locomotive Painters' Assoc. of U. S. and Canada.—A. P. Dane, B. & M., Reading, Mass. Annual meeting, September 9-12, Ottawa, Can.

National Railway Appliances Assoc.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Meetings with Am. Ry. Eng. Assoc.

New England Railroad Club.—G. H. Frazier, 10 Oliver St., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

New York Railroad Club.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

Northern Railroad Club.—C. L. Kennedy, C. M. & St. P., Duluth, Minn.; 4th Saturday, Duluth.

Peoria Association of Railroad Officers.—M. W. Rotchford, Union Station, Peoria, Ill.; 2d Tuesday.

Railroad Club of Kansas City.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

Railway Business Association.—Frank W. Noxon, 2 Rector St., New York Annual dinner, December 19, New York.

Railway Club of Pittsburgh.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

Railway Electrical Supply Manufacturers' Assoc.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

Railway Gardening Association.—J. S. Butterfield, Lee's Summit, Mo. Next meeting, August 12-15, Nashville, Tenn.

Railway Development Association.—W. Nicholson, Kansas City Southern, Kansas City, Mo.

Railway Signal Association.—C. C. Rosenberg, Bethlehem, Pa. Meetings, March 17, Chicago; June 10-11, New York; convention, October 14, Nashville, Tenn.

Railway Storekeepers' Association.—J. P. Murphy, Box C, Collinwood, Ohio. Annual convention, May 19-21, Chicago.

Railway Supply Manufacturers' Assoc.—J. D. Conway, 2135 Oliver bldg., Pittsburgh, Pa. Meetings with M. M. and M. C. B. Assocs.

Railway Tel. and Tel. Appliance Assoc.—W. E. Harkness, 284 Pearl St., New York. Meetings with Assoc. of Ry. Teleg. Sups.

Richmond Railroad Club.—F. O. Robinson, Richmond, Va.; 2d Monday, except June, July and August.

Roadmasters' and Maintenance of Way Association.—L. C. Ryan, C. & N. W., Sterling, Ill. Convention, September 8-12, 1913, Chicago.

St. Louis Railway Club.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

Signal Appliance Association.—F. W. Edmonds, 3868 Park Ave., New York. Meetings with annual convention Railway Signal Association.

Society of Railway Financial Officers.—C. Nyquist, La Salle St., Station, Chicago.

Southern Association of Car Service Officers.—E. W. Sandwich, A. & W. P. Ry., Montgomery, Ala. Next meeting, April 17, Atlanta, Ga.

Southern & Southwestern Railway Club.—A. J. Merrill, Grant bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., Atlanta.

Toledo Transportation Club.—J. G. Macomber, Woolson Spice Co., Toledo, Ohio; 1st Saturday, Toledo.

Track Supply Association.—W. C. Kidd, Ramapo Iron Works, Hillburn, N. Y. Meeting with Roadmasters' and Maintenance of Way Association.

Traffic Club of Chicago.—Guy S. McCabe, La Salle Hotel, Chicago; meetings monthly, Chicago.

Traffic Club of New York.—C. A. Swope, 290 Broadway, New York; last Tuesday in month, except June, July and August, New York.

Traffic Club of Pittsburgh.—D. L. Wells, Erie, Pittsburgh, Pa.; meetings monthly, Pittsburgh.

Traffic Club of St. Louis.—A. F. Versen, Mercantile Library building, St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.

Train Despatchers' Association of America.—J. F. Mackie, 7042 Stewart Ave., Chicago. Annual meeting, June 17, Los Angeles, Cal.

Transportation Club of Buffalo.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

Transportation Club of Detroit.—W. R. Hurley, L. S. & M. S., Detroit, Mich.; meetings monthly.

Traveling Engineers' Association.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y. Annual meeting, August, 1913, Chicago.

Utah Society of Engineers.—R. B. Ketchum, University of Utah, Salt Lake City, Utah; 3d Friday of each month, except July and August.

Western Canada Railway Club.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

Western Railway Club.—J. W. Taylor, Old Colony building, Chicago; 3d Tuesday of each month, except June, July and August.

Western Society of Engineers.—J. H. Warder, 1735 Monadnock Block Chicago; 1st Monday in month, except July and August, Chicago.

Traffic News.

The Black Diamond Express of the Lehigh Valley, between New York and Buffalo, is now an all-steel train, new Pullman parlor cars having been substituted for the parlor cars formerly used on this train.

At a recent meeting of the Transcontinental Passenger Association it was decided to make summer tourist fares to Pacific coast points during 1913 upon the same basis as prevailed last year—$72.50 for the round trip. Tickets will be on sale from June 1 to September 30, and the return limit will be October 31.

The eastern railways have decided to grant reduced fares for the presidential inauguration ceremonies in Washington next March. From points more than 100, and not more than 250 miles from Washington, the fare will be 2 cents a mile in each direction, and from points more than 250 miles from Washington the rates will be on a basis of one and one-half fares for the round trip. For parties of fifty or more, traveling together, a rate of 1½ cents per mile per capita in each direction will be made from points more than 100 miles from Washington.

The Railway Ticket Protective Bureau has issued a circular letter presenting the report of its general counsel, Brode B. Davis, on the successful issue of a criminal indictment obtained by the bureau, among others, against Arthur Sparks, Jr., who for many years conducted a ticket scalping shop at Kansas City, Mo. Sparks is one of four scalpers in Kansas City against whom criminal informations for forgery were filed by the bureau on May 25, 1910, after a raid upon their offices resulting in a seizure of hundreds of forged tickets and ticket forgers' instruments. In this case the bureau was confronted with every conceivable form of opposition, including the mysterious disappearance of a principal witness on several occasions. The defendant's punishment was fixed at a term of two years' imprisonment in the penitentiary.

Following the indictment of the Denver & Rio Grande and other roads at Pueblo, Col., for issuing intrastate free transportation to interstate shippers, that company has issued an order prohibiting the issuing of such passes in the future. The order, issued by J. B. Andrews, assistant to the vice-president, reads as follows: "The United States, acting through its department of justice, claims that it is unlawful for this company to give free local transportation (although appearing on its face to be good only in one state) to any person, or the officers or employees of any corporation or firm which makes or receives interstate shipments of property. If it is unlawful for the company to give, it is equally unlawful for the individual to solicit, receive or use, such transportation. To test the legality of such transportation the government has caused indictments to be presented against this company in the United States court. Pending a final decision by the courts of the question so raised, no free transportation will hereafter be honored by the company on any of its lines when presented by anyone known to be engaged in any degree in interstate commerce, or when presented by any officer or employee of any firm or corporation known to be so engaged in interstate commerce. All persons coming within the terms of this notice, and now holding passes or other forms of free transportation, are requested forthwith to return same to this company."

Traffic Club of New England.

The annual meeting of the Traffic Club of New England was held in Boston on the evening of December 6. The meeting was preceded by a dinner. The following officers were elected for the next year: President, Timothy E. Byrnes, vice-president New York, New Haven & Hartford; vice-presidents, J. H. Hustis, vice-president Boston & Albany; C. W. Robie, assistant general manager American Express Company; Sam W. Manning, general New England agent Sante Fe; Seward W. Jones, treasurer Jones Brothers Company; secretary, William C. Brown, D. F. S. Pennsylvania Railroad; treasurer, Charles E. Mayer, traffic manager, Stone & Webster; directors, Calvin Austin, Charles Stewart, E. K. Hall, J. H. Thomas, Henry W. Dwight, A. H. Van Pelt and G. M. Wood. After the business of the club had been transacted two addresses were made, one by Gen. William A. Bancroft, president of the Boston Elevated Railway, on "Some Observations on European Transportation," and the other by Samuel O. Dunn, editor of the *Railway Age Gazette*, on "Some Often Overlooked Points Regarding Government Ownership."

Crop Conditions.

The crop reporting board of the bureau of statistics of the United States Department of Agriculture estimates, from the reports of correspondents and agents of the bureau, as follows:

The area of winter wheat sown this fall is 2.5 per cent. less than the revised estimated area sown in fall of 1911, equivalent to a decrease of 828,000 acres, the indicated total area being 32,387,000 acres. The condition on December 1 was 93.2 against 86.6 and 82.5 on December 1, 1911 and 1910, respectively, and a ten-year average of 89.9.

The area of rye sown this fall is 1.4 per cent. less than the revised estimated area sown in fall of 1911, equivalent to a decrease of 35,000 acres, the indicated total area being 2,443,000 acres. The condition on December 1 was 93.5 against 93.3 and 92.6 on December 1, 1911 and 1910, respectively, and a ten-year average of 93.2.

Details by states follow:

WINTER WHEAT.

	Area Sown.			Condition December 1.		
		Autumn, 1912.				
States.	Autumn, 1911, Revised. 000 omt'd. Acres.	Comp'd with 1911. P. C.	Total Preliminary. 000 omt'd. Acres.	1912. P. C.	1911. P. C.	10-Year Average. P. C.
New York	353	97	342	94	98	95
New Jersey	84	99	83	98	90	93
Pennsylvania	1,300	102	1,326	95	92	91
Delaware	116	100	116	94	94	91
Maryland	618	100	618	93	94	90
Virginia	762	99	754	92	94	88
West Virginia	241	99	239	91	95	89
North Carolina	618	100	618	92	88	90
South Carolina	83	99	82	94	87	92
Georgia	142	103	146	94	89	93
Ohio	2,033	97	1,972	95	83	86
Indiana	2,355	94	2,214	93	82	87
Illinois	2,545	90	2,290	94	79	88
Michigan	946	92	870	90	86	89
Wisconsin	94	97	91	93	94	94
Iowa	353	98	346	93	96	94
Missouri	2,474	95	2,350	95	85	90
Nebraska	3,156	101	3,188	96	92	94
Kansas	7,375	96	7,080	92	88	89
Kentucky	788	96	756	85	83	89
Tennessee	714	99	707	89	88	90
Alabama	32	103	33	88	90	93
Mississippi	10	90	9	85	87	91
Texas	766	99	758	83	72	88
Oklahoma	1,744	101	1,761	92	78	86
Arkansas	101	102	103	91	86	88
Montana	493	113	557	95	94	..
Wyoming	35	96	34	95	96	..
Colorado	209	106	222	97	88	..
New Mexico	37	125	46	88	77	..
Arizona	25	110	28	99	100	..
Utah	172	108	186	96	96	..
Nevada	16	98	16	99	93	..
Idaho	348	100	348	96	94	96
Washington	1,035	110	1,138	100	91	92
Oregon	640	89	570	97	98	96
California	402	97	390	91	75	92
United States....	33,215	97.5	32,387	93.2	86.6	89.9

RYE.

Michigan	400	96	384	91	89	92
Wisconsin	391	97	379	95	95	95
Minnesota	322	101	325	92	96	92
Pennsylvania	301	99	298	97	93	92
New York	143	98	140	96	97	95
New Jersey	78	100	78	97	94	95
Indiana	78	103	80	94	92	92
North Dakota	73	97	71	86	93	91
Nebraska	68	98	67	95	95	94
Ohio	64	110	70	93	88	89
All other	560	98	551	93	93	93
United States....	2,478	98.6	2,443	93.5	93.3	93.2

INTERSTATE COMMERCE COMMISSION.

The commission has ordered that its regulations for the transportation of explosives and other dangerous articles shall apply to all shipments, including materials and supplies belonging to the carrier.

The commission has modified tariff circular No. 18-A by adding a provision that excursion fares, limited to short periods of time,

may be announced by railroads in the territory of Alaska without giving the three days' notice.

The commission has completed its elaborate list of proposed new rates for the transportation of merchandise by express companies and within a few days probably will fix a date, a month or two in the future, on which the express companies will be given a hearing.

The commission has suspended from December 16 until April 15 the first revised pages in the tariff of the Canadian Pacific which advance from 15 cents to 18 cents per 100 lbs. a proportional commodity rate on paper, in carloads, from Brownville Junction, Me., to Akron, Ohio.

The commission has suspended from December 7 until April 5 the supplement to the tariff of the Missouri Pacific which provides for cancellation of existing joint rates on cottonseed from points in Oklahoma on the Missouri, Oklahoma & Gulf to Little Rock and other points in Arkansas. The cancellation of present joint rates and substitution of combination rates will result in advances ranging from 3 cents to 13 cents per 100 lbs.

The commission has suspended from December 6 until April 4 the item in the supplement to Countiss' Trans-Continental Freight Bureau tariff bearing the caption "railway equipment, new or second-hand, when handled as freight." This item advances from $90 to $163.50 per car the rate for the transportation of empty freight cars to California terminals from group F, which includes certain points in Illinois, Indiana, Michigan, Iowa, Kansas, Minnesota, Missouri, Nebraska and Wisconsin.

In order to avoid controversies and questions the commission requires that tariffs hereafter issued containing rates applicable to export or import traffic shall specify by inclusion or exclusion the countries to or from which shipments to which such rates are applicable shall move, whether such countries are or are not adjacent to the United States. In the interest of clearness the tariffs should also specify whether or not shipments to or from Cuba, the Philippine Islands, Porto Rico, or the Canal Zone are included. For convenience and without regard to the political status and relation of the Philippines, Porto Rico and the Canal Zone to the United States they, together with Cuba, are for these purposes to be classed with foreign countries.

Morganton, N. C., and Old Fort Discriminated Against.

Union Tanning Company, et al., v. Southern Railway, et al. Opinion by the commission:

The present rate on coal from the Apalachia and Dante fields to Old Fort, N. C., is 25 cents per ton higher than the rate from the same fields to Canton, Ohio; and the rate from the same field to Morganton, N. C., is 55 cents per ton higher than the rate to Canton. The complainants contend that this adjustment is unduly discriminatory to old Fort and Morganton and asks reparation. The commission found that the present relation of rates on coal to Canton, Old Fort and Morganton amounts to an undue discrimination against the complainant and that the rate to Old Fort should not be more than 5 cents per ton higher than the rate to Canton, and that the rate to Morganton should not be more than 35 cents higher than the rate to Canton. Reparation was awarded. (25 I. C. C., 112.)

Rates on Box Lumber and Box Shooks Reduced.

Multnomah Lumber & Box Company, et al., v. Southern Pacific Company, et al. Opinion by Commissioner Clark:

The commission found that the rates on box lumber and box shooks from Portland and Astoria, Ore., to California and other interstate destinations were unjust and unreasonable and ordered that in future they should not exceed by more than 50 cents per ton the rates contemporaneously maintained on the same commodities in carloads from Cottage Grove, Ore., or by more than $1 per ton the rates on the same commodities in carloads from Glen Dale, Ore. The commission also ordered that joint rates on box lumber and box shooks should be established from Astoria via Portland to the same destinations, and that these rates should not exceed by more than 5 cents per 100 lbs., the rates contemporaneously charged from Portland. Reparation was awarded. (25 I. C. C., 123.)

Cannel Coal Rates Reduced.

North Fork Cannel Coal Company v. Ann Arbor Railroad, et al. Opinion by Commissioner McChord:

From the complainant's Kanawha district mines in Kentucky the Chesapeake & Ohio maintains rates from 15 to 20 cents per ton higher on cannel coal than on bituminous coal. No rates on bituminous coal are published from Redwine, Ky., as no coal of that character is there mined. To certain points in Central Freight Association territory the rates on cannel coal from Redwine are from 5 cents to $1.15 more than the cannel coal rates from the Kanawha district. The complainant contends that it is unreasonable and unjustly discriminatory against cannel coal to charge more for it than for the transportation of bituminous coal; and also that the rates from Redwine should not exceed the bituminous rates from the Kanawha district by more than 20 cents. The commission found that no discrimination resulted from the existence of lower rates on bituminous coal than on cannel coal from the Kanawha district. The defendants explain that the Redwine rates were made the same as the Cannel City rates, and were made with no relation whatever to the Kanawha district rates. The commission found that that fact explained but did not necessarily justify the existence of the present rates from Redwine, because there was not sufficient basis for the assumption that the Cannel City rates are reasonable. The commission decided that the rates on cannel coal from Redwine are unreasonable to the extent that they exceed by more than 40 cents per ton the rates on cannel coal from the Kanawha district. Rates on this basis were prescribed for the future. Reparation was awarded. (25 I. C. C., 241.)

Export Shipments.

Galveston Commercial Association et al. v. Atchison, Topeka & Santa Fe et al. Opinion by Chairman Prouty:

The commission has no direct authority to require the issuing of a through export bill of lading, since it has no jurisdiction over the water carrier, which is a necessary party to that contract, but this must not be understood as meaning that the commission may not act upon the rail carrier, which is subject to its jurisdiction in a proper case where the ocean carrier stands ready to enter into these through arrangements upon reasonable terms.

It is not unreasonable to require of the carrier to ascertain before receiving the cotton for transportation to Galveston for export whether it can be cared for at Galveston upon its receipt and the ship agent should be at once provided with a copy of whatever contract of shipment has been signed by the railway agent on his behalf.

To decline to issue bills of lading through Galveston while issuing them through other ports would be an undue discrimination against Galveston, unless justified by difference in conditions at the different ports, which does not appear in this record.

The public interest requires the issuance of these through bills of lading. The cotton crop of Texas cannot be handled without great inconvenience under any other system, and unless there is some strong objection that method should be maintained, but when the through export bill is issued the shipper cannot, as a practical matter, be made answerable for demurrage charges. This charge should be cast upon the ship agent upon such terms and conditions as will not impose upon him an unreasonable burden.

After January 1, 1913, no justification can exist for not imposing substantially equivalent demurrage charges at New Orleans and at Texas ports, which are imposed at Galveston, and it will be an undue discrimination not to do so.

At least six days' free time should be allowed at Galveston upon export business, and if the consignee, before 6 o'clock in the evening of the sixth day, orders the car placed for unloading, the car shall be treated as unloaded during the sixth day, and no demurrage assessed against it, provided there is room upon the pier to unload it.

Conditions at Galveston call for the application of an average demurrage rule, and four days is found to be a just period as the basis for computing such average demurrage.

Reparation on account of demurrage charges was denied. (25 I. C. C., 216.)

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF OCTOBER, 1912.

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total. inc. misc.	Maintenance Way and structures.	Maintenance Of equipment.	Traffic.	Transportation.	General.	Total.					
Ann Arbor	292	$136,012	$43,832	$191,349	$20,276	$27,117	$3,934	$62,997	$7,549	$121,873	$69,476	$821	$13,930	$56,367	—$6,560
Arizona Eastern	366	176,172	44,718	234,270	25,307	11,321	2,416	56,616	10,014	105,674	128,596	—101	5,096	123,399	73,863
Atlanta & West Point	93	68,814	41,096	120,935	14,514	18,774	5,259	39,670	5,450	83,667	37,268	—161	5,677	31,430	—1,971
Baltimore & Ohio—System	4,455[1]	7,471,502	1,436,315	9,408,363	1,296,753	1,533,775	160,358	3,155,635	174,987	6,321,508	3,086,855	—56,015	231,473	2,799,367	418,835
Baltimore & Ohio Chicago Terminal	77	.....	2,199	174,483	25,196	26,451	650	72,641	4,627	129,565	44,918	852	19,115	26,655	2,845
Boston & Maine	2,244[2]	2,759,612	1,434,319	4,516,478	580,556	654,876	38,785	1,948,964	102,322	3,325,503	1,190,975	9,925	183,091	1,017,809	43,069
Buffalo & Susquehanna *R. R.*	265	158,087	7,781	170,162	32,007	22,719	1,393	54,767	5,896	116,782	53,380	.....	2,200	51,180	38,328
Buffalo & Susquehanna *Ry.*	91	46,451	8,597	57,929	11,629	28,483	528	23,405	2,483	66,528	—8,599	—41	1,500	—10,140	—7,720
Butte, Anaconda & Pacific	46	89,734	9,306	109,304	12,981	24,244	574	53,894	2,958	94,651	14,653	.....	2,000	12,653	2,745
Carolina, Clinchfield & Ohio Ry. Co.	238	199,191	14,908	218,398	13,148	22,836	6,952	34,707	6,907	84,550	133,848	.....	8,000	125,848	41,571
Carolina, Clinch. & Ohio Ry. Co. of S. C.	18	12,938	1,877	15,008	581	88	1,019	3,477	411	5,576	9,432	.....	500	8,932	3,326
Central of Georgia	1,915	983,757	337,509	1,443,301	178,695	216,436	34,865	432,692	41,826	904,514	538,787	6,179	51,450	493,516	—45,776
Central Vermont	411	256,936	106,114	389,884	50,262	70,962	9,925	185,218	9,379	325,746	64,138	463	12,200	52,401	—37,130
Chesapeake & Ohio Lines	2,315[3]	2,246,957	505,028	3,107,620	348,086	638,002	56,871	925,605	72,714	2,041,278	1,066,342	1,070	102,155	965,257	117,604
Chicago & Alton	1,026	1,080,777	403,769	1,595,115	201,693	278,225	48,707	518,699	33,833	1,081,157	513,958	—1,921	38,000	474,037	137,363
Chicago & Erie	270	426,868	64,523	535,996	85,977	103,617	19,936	264,145	10,770	484,445	51,551	—1,081	13,333	37,137	—18,991
Chicago, Burlington & Quincy	9,074	6,803,379	2,015,349	9,575,518	936,434	1,515,872	124,247	2,674,849	314,168	5,565,570	4,009,948	—10,768	288,996	3,710,184	669,484
Chicago, Indiana & Southern	359	381,669	28,667	423,041	47,554	97,256	9,126	124,029	8,582	286,547	136,494	1,460	20,000	117,954	54,266
Chicago, Indianapolis & Louisville	617	466,497	152,728	674,004	87,671	75,483	18,906	233,013	15,304	430,377	243,627	.....	22,640	220,987	33,766
Chicago Junction	12	.....	.....	180,764	20,143	9,041	1,098	83,384	3,133	116,799	63,965	.....	2,171	61,794	9,712
Chicago, Milwaukee & Puget Sound	2,081[4]	1,795,414	320,954	2,165,324	165,477	200,793	44,584	558,493	20,351	989,698	1,175,626	11,782	75,000	1,112,408	368,147
Chicago, Milwaukee & St. Paul	7,511	5,337,575	1,335,237	7,244,753	864,580	903,460	108,921	2,490,016	79,315	4,466,292	2,778,461	9,700	235,041	2,553,120	841,640
Chicago, Peoria & St. Louis	255	124,247	36,846	169,681	27,979	33,182	6,535	73,839	5,656	147,191	22,490	.....	4,300	18,190	—9,887
Chicago, Rock Island & Gulf	477	247,966	67,551	333,525	31,438	26,264	10,548	103,847	8,925	181,022	152,503	—832	5,594	146,077	31,635
Chicago, Terre Haute & Southeastern	351	166,055	17,888	188,581	32,358	37,533	3,153	53,308	7,293	133,645	54,936	—452	10,000	44,484	—4,369
Cincinnati Northern	245[5]	133,509	15,923	155,324	21,498	22,853	2,522	57,063	3,522	107,458	47,866	.....	5,300	42,566	23,892
Cleveland, Cincinnati, Chic. & St. Louis	2,012[6]	2,259,691	657,775	3,188,641	350,538	528,016	77,495	1,121,883	59,129	2,137,061	1,051,580	—1,488	95,000	955,092	284,739
Delaware & Hudson Co.—R. R. Dept	854[7]	1,679,701	267,825	2,021,741	169,064	284,819	20,840	690,204	54,136	1,219,063	802,678	—3,138	48,069	751,471	—19,538
Denver & Rio Grande	2,554[8]	1,868,952	518,748	2,485,472	283,093	384,585	46,360	784,127	51,534	1,549,699	935,773	1,863	75,000	862,636	372,348
Denver, Northwestern & Pacific	215	89,389	18,091	112,745	14,545	17,687	2,195	34,497	3,668	72,592	40,153	.....	3,500	36,653	—2,762
Detroit & Toledo Shore Line	79	111,937	.....	112,171	11,179	6,778	995	30,044	2,469	51,465	60,706	.....	4,650	56,056	403
Detroit, Grand Haven & Milwaukee	191	146,000	63,000	238,975	62,430	23,205	5,990	104,459	4,770	200,854	38,121	—45	2,953	35,123	—4,765
Detroit River Tunnel	2	.....	.....	103,380	2,427	2,752	.....	8,157	48	13,384	89,996	.....	4,500	85,496	2,839
Detroit, Toledo & Ironton	441	146,750	14,843	173,457	33,960	16,124	2,797	72,580	4,674	130,135	43,322	.....	6,000	37,322	8,985
Duluth & Iron Range	274[9]	920,122	20,008	952,324	89,894	72,513	579	179,045	10,147	352,178	600,146	8,955	42,516	566,585	—29,480
Duluth, Missabe & Northern	351[10]	1,130,243	38,052	1,178,525	67,554	95,076	2,041	204,114	10,994	379,779	798,746	6,665	56,537	748,874	246,382
El Paso & Southwestern Co.	902	637,541	84,805	757,682	70,702	88,117	12,528	168,741	24,669	364,757	392,925	—2,127	22,238	368,560	134,712
Elgin, Joliet & Eastern	823[11]	1,064,889	3	1,149,904	111,361	166,518	4,547	292,522	16,046	590,994	558,910	.....	23,333	535,577	160,860
Erie	1,988[12]	3,767,452	781,169	4,903,521	627,141	829,598	99,041	1,593,719	82,250	3,231,749	1,671,772	15,454	152,835	1,534,391	55,301
Florida East Coast	642[13]	190,061	98,437	326,788	70,175	54,036	5,425	123,114	10,136	262,886	63,902	2,890	15,500	45,512	8,814
Fort Worth & Denver City	454	390,174	155,424	567,572	41,490	82,772	6,937	176,857	15,535	323,591	243,981	—188	11,700	232,093	33,261
Galveston, Harrisburgh & San Antonio	1,338	841,463	276,002	1,175,273	89,376	236,062	32,137	405,301	29,979	792,855	382,418	—5,634	35,123	341,661	99,369
Georgia, Southern & Florida	395	119,720	72,218	219,076	25,934	45,738	8,255	87,026	10,067	177,020	42,056	.....	10,626	31,430	—24,020
Great Northern	7,712[14]	6,851,636	1,430,246	8,737,612	918,388	832,933	98,772	2,109,029	105,228	4,064,350	4,673,262	20,553	413,799	4,280,016	571,740
Gulf & Ship Island	308	128,341	36,589	177,045	26,543	36,837	2,653	48,313	9,225	123,571	53,474	.....	5,055	48,419	4,925
Gulf, Colorado & Santa Fe	1,596[15]	1,119,069	296,695	1,497,649	262,702	206,951	24,506	453,272	29,053	976,484	521,165	.....	40,435	480,730	89,105
Hocking Valley	352[16]	606,155	81,042	734,800	78,567	150,199	8,555	195,277	14,460	447,058	287,742	.....	44,400	243,342	56,917
Houston, East & West Texas	191	99,695	28,166	135,969	25,596	18,825	2,041	39,536	3,710	89,738	46,231	.....	3,940	42,291	2,287
Houston & Texas Central	789	499,161	189,572	724,266	83,429	109,376	24,442	235,442	17,186	469,875	254,391	—1,504	20,264	232,623	87,854
Illinois Central	4,763	3,993,740	1,206,421	5,895,621	852,517	1,220,255	113,256	2,152,092	129,594	4,467,714	1,427,907	—10,159	237,750	1,179,998	683,238
Indiana Harbor Belt	105[17]	.....	.....	291,129	33,819	39,511	3,084	122,891	6,076	205,381	85,748	3,173	5,560	83,361	33,165
International & Great Northern	1,160	1,025,380	258,922	1,354,425	102,590	142,649	28,156	457,995	32,360	763,750	590,675	—1,819	30,000	558,856	81,340
Kanawha & Michigan	177[18]	253,913	33,215	293,153	39,480	48,092	2,041	80,553	6,792	176,958	116,195	—10	8,989	107,196	—18,166
Lake Erie & Western	886	459,394	73,305	562,333	68,814	96,221	12,151	203,723	11,844	392,753	169,580	.....	20,548	149,032	61,933
Lake Shore & Michigan Southern	1,873[19]	3,597,589	1,004,077	5,172,316	614,235	771,507	60,313	1,532,664	74,157	3,052,876	2,119,440	15,921	145,000	1,990,361	336,641
Lehigh & Hudson River	97	151,250	3,877	159,136	20,531	20,318	1,294	54,103	4,692	100,938	58,198	.....	4,000	54,198	—2,886
Lehigh Valley	1,453[20]	3,438,874	380,950	3,947,469	667,756	586,667	77,126	1,211,213	62,484	2,605,246	1,342,223	—4,319	117,500	1,220,404	137,157
Louisiana & Arkansas	255	102,523	20,528	128,132	25,781	22,519	2,521	36,265	5,183	92,269	35,863	.....	4,131	31,732	441
Louisiana Western	208	130,623	55,747	195,336	19,511	29,123	7,485	63,818	5,668	125,605	69,731	274	7,228	62,775	32,463
Michigan Central	1,817[21]	2,155,119	704,546	3,204,940	383,939	387,422	62,093	1,134,705	49,982	2,018,141	1,186,799	2,741	116,000	1,073,540	171,506
Minneapolis & St. Louis	1,586	756,495	156,688	961,650	128,948	109,965	19,171	348,024	20,896	627,004	334,646	59	33,088	301,617	87,229
Missouri, Kansas & Texas System	3,398	2,365,945	892,498	3,440,888	363,205	344,586	63,327	1,040,880	89,086	1,901,084	1,539,804	—5,225	100,276	1,434,303	340,119
Missouri Pacific	3,920[22]	2,055,794	482,267	2,737,876	447,843	479,990	59,587	1,096,901	68,293	2,152,614	585,262	—4,054	93,390	487,818	306,291
Morgan's La. & Tex. R. R. & S. S. Co.	404	298,971	95,391	414,061	65,349	70,261	13,532	160,887	10,886	326,915	87,146	—3,133	18,075	65,938	—2,452
Nashville, Chattanooga & St. Louis	1,231[23]	833,270	260,128	1,170,229	166,988	209,919	36,535	422,403	28,411	864,256	305,973	—1,075	25,416	279,482	36,042
Nevada Northern	165	62,299	22,007	89,388	15,285	14,210	382	18,969	3,362	52,208	37,180	.....	5,991	31,189	—26,668
New Orleans Great Northern	283	91,438	30,549	133,381	22,127	17,134	2,715	42,486	6,790	91,252	42,129	—118	1,750	40,261	—1,719
New Orleans, Mobile & Chicago	547[24]	180,491	30,199	224,901	32,186	23,252	3,344	73,370	7,066	139,218	85,683	—49	4,154	81,480	15,650
New Orleans, Texas & Mexico	277[25]	116,627	17,847	145,888	32,077	13,246	4,494	60,545	6,470	116,832	29,056	.....	1,292	27,764	111
New York Central & Hudson River	3,595[26]	6,480,973	2,812,655	10,402,940	1,518,421	1,932,113	176,869	3,508,116	221,622	7,357,141	3,045,799	54,608	536,967	2,563,440	435,641
New York, Ontario & Western	566	656,267	105,338	801,425	121,728	131,041	11,818	299,491	13,182	577,260	224,165	—1,490	18,167	204,508	25,641
New York, Susquehanna & Western	154[27]	175,107	49,058	251,396	33,332	36,740	2,602	108,699	4,558	185,951	65,445	6,616	14,673	57,388	96,593
Norfolk & Western	2,018[28]	3,353,888	412,929	3,888,376	514,077	720,328	55,544	1,123,196	69,477	2,482,622	1,405,754	—2,298	120,000	1,283,456	199,691
Norfolk Southern	562	196,991	73,228	290,296	36,812	40,477	4,981	84,929	15,548	182,747	107,549	—1,236	7,510	98,803	—206
Northwestern Pacific	401[29]	159,632	152,689	335,260	44,259	39,198	3,176	117,195	12,565	216,393	118,867	.....	12,579	106,288	9,491

Mileage operated in previous period—[1] 4,434; [2] 2,225; [3] 2,242; [4] 2,059; [5] 246; [6] 2,010; [7] 852; [8] 2,556; [9] 263; [10] 328; [11] 842; [12] 1,995; [13] 583; [14] 7,345; [15] 1,603; [16] 353; [17] 109; [18] 176; [19] 1,776; [20] 1,431; [21] 1,805; [22] 3,916. [23] 1,255; [24] 404; [25] 264; [26] 3,591; [27] 152; [28] 2,004; [29] 404. —Indicates Deficits, Losses and Decreases.

REVENUES AND EXPENSES OF RAILWAYS.

MONTH OF OCTOBER—CONTINUED.

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses				Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
		Freight.	Passenger.	Total. inc. misc.	Maintenance Way and structures.	Maintenance Of equipment.	Traffic.	Transportation.	General.	Total.					
Oregon Short Line	1,762[30]	1,712,014	442,379	2,278,735	211,552	223,965	29,450	545,112	49,715	1,059,794	1,218,941	3,170	126,075	1,096,036	38,383
Pecos & Northern Texas	479[31]	198,621	44,746	254,257	18,300	43,259	3,674	75,900	6,077	147,210	107,047	.....	2,460	104,587	59,932
Peoria & Eastern	352	244,121	67,062	330,935	46,049	55,752	4,483	116,512	5,667	228,463	102,472	.....	9,800	92,672	13,835
Pittsburgh & Lake Erie	221[32]	1,625,036	145,574	1,836,555	157,063	250,112	13,944	371,529	24,125	816,723	1,019,782	—630	31,000	988,152	352,220
Pittsburgh, Shawmut & Northern	279[33]	174,334	8,324	186,096	22,349	31,759	1,162	57,115	3,591	115,976	70,120	.....	1,590	68,530	26,456
St. Joseph & Grand Island	319	116,282	38,264	168,854	30,610	18,851	5,328	69,527	5,676	129,992	38,862	358	6,396	32,824	—698
St. Louis & San Francisco	4,742[34]	2,861,259	960,968	4,082,697	500,896	483,190	75,608	1,356,832	104,745	2,521,271	1,561,426	.....	176,348	1,385,078	47,530
St. Louis, Iron Mountain & Southern	3,318[35]	2,344,964	555,882	3,100,462	554,717	479,209	49,243	933,442	68,288	2,084,899	1,015,563	—6,847	90,795	917,921	96,527
St. Louis Merchants' Bridge Terminal	9	.....	401	208,101	31,510	6,170	756	94,542	6,645	139,623	68,478	.....	6,100	62,378	19,426
St. Louis, San Francisco & Texas	244	107,214	39,362	154,742	29,517	16,726	2,452	54,348	5,385	108,428	46,314	.....	1,579	44,735	8,746
St. Louis Southwestern	906[36]	601,717	135,735	773,114	81,347	118,265	29,208	168,115	27,156	424,091	349,023	—1,048	24,058	323,917	21,711
St. Louis Southwestern of Texas	703	366,004	119,779	513,554	84,891	92,836	14,697	169,352	20,683	382,459	131,095	—366	10,300	120,429	—27,778
San Pedro, Los Angeles & Salt Lake	1,135[37]	572,759	269,936	908,053	92,390	138,778	32,496	285,526	18,478	567,668	340,385	—1,368	32,000	307,017	245,485
Southern Kansas of Texas	125	130,064	20,049	155,269	8,831	30,408	2,208	44,432	3,473	89,352	65,917	.....	861	65,056	39,124
Southern Pacific Co.	6,313[38]	6,101,720	2,757,451	9,429,828	987,627	1,202,057	167,910	2,347,101	213,234	4,917,929	4,511,899	188,803	366,346	4,334,356	398,916
Terminal R. R. Ass'n of St. Louis	34[39]		289	281,254	38,064		1,017	102,301	5,401	163,164	118,090	12,510	26,900	103,700	23,295
Texas & New Orleans	458	252,362	103,828	376,119	67,855	16,381	8,093	145,014	11,200	319,643	56,476	—14,800	13,384	28,292	—30,677
Texas & Pacific	1,885	1,345,885	451,388	1,971,057	136,825	87,481	34,846	750,159	46,104	1,217,275	753,782	3,215	48,111	708,886	11,912
Toledo & Ohio Central	443	434,555	53,329	514,872	62,273	87,919	6,075	166,325	8,547	331,139	183,733	—398	20,352	162,983	37,135
Toledo, Peoria & Western	248	81,354	48,061	140,405	17,633	25,912	2,713	45,809	3,694	95,761	44,644	.....	4,800	39,844	18,249
Toledo, St. Louis & Western	451	304,010	31,603	357,517	60,577	51,083	13,612	118,041	10,279	253,592	103,925	.....	14,800	89,125	17,105
Trinity & Brazos Valley	463	273,017	57,395	342,209	39,146	29,051	9,762	130,579	13,594	222,132	120,077	.....	4,150	115,927	—8,078
Union Pacific	3,575[40]	4,035,448	1,006,196	5,469,866	535,010	555,173	85,859	1,330,139	104,968	2,611,149	2,858,717	—3,188	180,898	2,674,631	284,385
Virginia & Southwestern	240	137,443	15,654	157,460	23,589	34,853	2,077	42,567	3,619	106,705	50,755	.....	5,600	45,155	—10,933
Virginian	475	453,929	21,472	486,837	62,457	93,185	5,093	112,321	8,794	281,850	204,987	6,636	17,400	194,223	30,937
Wabash	2,515	2,113,446	658,619	3,014,984	362,867	472,080	79,689	1,153,021	64,431	2,132,088	882,896	—4,619	71,153	807,124	67,480
Washington Southern	36	38,291	37,063	100,237	13,995	12,714	1,276	38,748	2,828	69,561	30,676	.....	3,173	27,503	2,484
West Jersey & Seashore	356[41]	171,224	250,987	460,270	80,528	72,971	14,902	210,098	12,325	390,824	69,446	—6,893	11,099	51,454	77,038
Western Pacific	937	478,204	137,849	632,032	74,051	43,321	27,418	211,657	25,379	381,826	250,206	—1,196	20,203	228,807	130,941
Western Ry. of Alabama	133	78,191	47,797	137,629	18,803	22,034	5,823	35,160	5,784	87,604	50,025	361	4,640	45,746	—6,571
Wheeling & Lake Erie	459[42]	716,045	54,532	808,631	105,074	134,645	8,789	230,021	14,160	492,689	315,942	5,189	32,782	288,349	52,603
Yazoo & Mississippi Valley	1,374	747,739	231,117	1,041,803	178,892	133,760	15,261	366,081	28,595	722,589	319,214	254	3,700	282,468	157,503

[30] Mileage operated in previous period—1,667; [31] 296; [32] 215; [33] 240; [34] 4,732; [35] 3,314; [36] 811; [37] 1,113; [38] 6,183; [39] 35; [40] 3,506; [41] 355; [42] 457;— Indicates Deficits, Losses and Decreases.

Brick Rates Adjustment.

Evans & Howard Fire Brick Company v. St. Louis, Iron Mountain & Southern, et al.

Evans & Howard Fire Brick Company v. St. Louis & San Francisco, et al.

Lacleve-Christy Clay Products Company v. Abilene & Southern, et al. Opinion by Commissioner Clark:

The questions involved in these three cases are the same, so they have been treated in one report. The complaint alleges that the higher rates on fire brick than on pressed or face brick from St. Louis to Texas are unjustly discriminatory. The commission basing its findings on *Stowe-Fuller Company v. Pennsylvania Railroad,* 12 I. C. C., 216, and *Metropolitan Paving Brick Company v. Ann Arbor Railroad,* 17 I. C. C., 197, decided that paving, pressed, face and fire brick should take the same rate. The commission also decided that the present rate on fire brick of 27 cents per 100 lbs. to Texas common points was not unreasonable in itself. The commission also found that in the readjustment the rates from Versailles, Mo., should be kept in their present relationship to the rates from St. Louis. These rates are now the same. The commission suggested that all brick, other than common brick should be included in one item at the same rate. If the defendants do not bring their tariff provisions into conformity with these views within 60 days, the commission will enter such an order as is necessary. Reparation was asked, but was denied. (25 I. C. C., 141.)

Wool Case Order Modified.

In re investigation of alleged unreasonable rates and practices involved in the transportation of wool, hides and pelts from various western points of origin to eastern destination.

National Wool Growers' Association v. Oregon Short Line, et al.

Railroad Commission of Oregon v. Oregon Railroad & Navigation Company, et al. Opinion by Chairman Prouty:

The commission found that the minimum of 24,000 lbs. for cars 36 ft. long, prescribed by it for the transportation of wool in the original report, 23 I. C. C., 151, mentioned in the *Railway Age Gazette* of April 19, page 933, imposes upon the shipper no unreasonable burden and increases the car efficiency and the economy of transportation; but if cars less than 36 ft. long are tendered for shipment they should be covered by a proper tariff provision. The complainant contends that the rate on sack wool should not exceed the rate on baled wool where the loading of sack wool equals or exceeds the minimum prescribed for baled wool. The commission denied this prayer. The rates on scoured wool from Albuquerque, N. Mex., to the east were found to be unreasonable and the commission ordered that in future they should be reduced by as much per 100 lbs. as the rates on wool in the grease were reduced by the commission in the original report. The commission adhered to its former decision that wool in the territory covered by the investigation should take the fourth class rate with a minimum of 24,000 lbs. (25 I. C. C., 185.)

STATE COMMISSIONS.

The order of the Canadian Railway Commission authorizing an increase in demurrage rates from $1 to $2 and $3 a day, was noticed last week. The request of the railways for a $4 rate for the third and succeeding days was not allowed by the commission; nor does the order apply to cars held in transit at stopover points under published tariffs.

The New York State Public Service Commission First district (New York City), asks for $1,763,000 for the expenses of the commission for the ensuing year. This is $208,500 more than the budget for the current year, and is due entirely to the new rapid transit work. It is estimated that the rapid transit expenditures in 1913 will require more than $1,300,000.

COURT NEWS.

In the federal court at Salt Lake City last week Judge John A. Marshall, overruling the demurrer of the Union Pacific, held that a railroad which carries the mails is liable for loss of registered matter destroyed in the wreck of a train. The government brought suit for $12,000 for compensation for postal losses in a disaster which occurred in Wyoming seven years ago.

Railway Officers.

Executive, Financial and Legal Officers.

Robert I. Farrington has tendered his resignation as vice-president of the Great Northern to take effect December 31.

Newman Erb has been elected president of the Ann Arbor, succeeding Joseph Ramsey, Jr., resigned. Mr. Erb was already chairman of the board.

R. B. Fowler has been elected president and general manager of the Tremont & Gulf, with headquarters at Winnfield, La., to succeed W. H. Seaman, resigned.

Edward A. Haid has been appointed assistant general attorney of the St. Louis Southwestern, with headquarters at St. Louis, Mo., succeeding Roy F. Britton, resigned.

A. C. Parks, general superintendent of the Southwestern Railway at Henrietta, Texas, has been elected vice-president and general manager, and his former position has been abolished.

J. A. McDonald, auditor of disbursements of the Lake Erie & Western, the Ft. Wayne, Cincinnati & Louisville, and the Northern Ohio, at Indianapolis, Ind., has been appointed assistant auditor, with office at Indianapolis, succeeding J. I. Whallon, resigned, and G. A. Wallis succeeds Mr. McDonald.

Operating Officers.

Edward M. Reese has been appointed chief train despatcher on the Pennsylvania Lines West of Pittsburgh, Western division.

F. A. C. Ferguson has been appointed trainmaster of the Vicksburg, Shreveport & Pacific, with office at Shreveport, La., succeeding B. B. Fowler, resigned.

C. F. Myers has been appointed superintendent of car service and telegraph of the Mexico North-Western, with office at Ciudad Juarez, Chih., Mexico, and the office of car accountant has been abolished.

Homer W. Loomis, roadmaster of the Lake Shore & Michigan Southern at Hillsdale, Mich., has been appointed trainmaster of the Lansing division, with office at Hillsdale, succeeding W. D. Stearns, whose headquarters were at Jackson, Mich.

W. F. Schaff, assistant division superintendent of the Lake Shore & Michigan Southern at Cleveland, Ohio, has been appointed superintendent of the Detroit division, succeeding T. W. Niles, who has been assigned to special duties to be designated by the general superintendent.

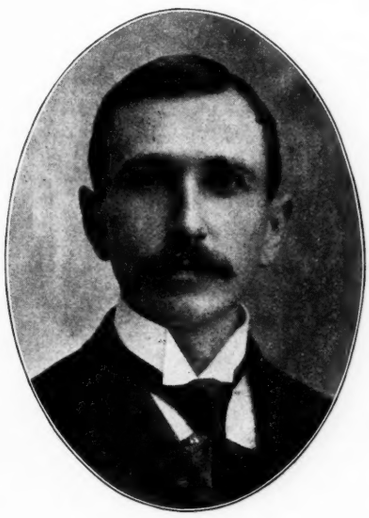
C. A. Manthe has been appointed trainmaster of the Marcus division of the Great Northern, with office at Marcus, Wash., in place of B. Lantry, promoted. W. D. Mason has been appointed trainmaster of the Fergus Falls division, with headquarters at Melrose, Minn., in place of Mr. Manthe. J. A. Frogner succeeds Mr. Mason as trainmaster of the Sioux City division at Sioux City, Ia.

J. L. Hayes, trainmaster of the Pere Marquette at Plymouth, Mich., has been appointed superintendent of the Port Huron division, which has just been established and embraces the lines Saginaw to Port Huron, Saginaw to Bad Axe, Port Huron to Grindstone City, and the Almont, Port Hope and Sandusky branches. The headquarters of Mr. Hayes will be at Saginaw, Mich. F. P. Little has been appointed trainmaster of the Port Huron division, with office at Port Huron, Mich. The Canadian division will consist of the lines in Canada, and W. K. Tasker has been appointed superintendent, with office at St. Thomas, Ont. J. W. Mulhern has been appointed superintendent of the Grand Rapids division, with headquarters at Grand Rapids, Mich., to succeed R. P. Dalton, resigned. Effective December 1.

J. D. Hester, who has been appointed superintendent of the Shenandoah division of the Norfolk & Western, with headquarters at Roanoke, Va., was born on September 26, 1866, at Marion, Va., and was educated in the common schools of his native town. He began railway work on August 19, 1885, with the Norfolk & Western as freight delivery clerk and has been in the continuous service of that company ever since. He learned telegraphy and ten months later was promoted to assistant agent and operator, remaining in that position until January, 1889, when he became a brakeman. He was promoted to freight conductor in September, 1890, and in January, 1899, was made assistant trainmaster at East Radford, Va. In May, 1901, he was made trainmaster of the Shenandoah division at Roanoke, and in April, 1905, was transferred in the same capacity to the Radford division, and now becomes superintendent of the Shenandoah division of the same road, as above noted.

Clayton N. Woodward, whose appointment as general superintendent of the New York, New Haven & Hartford, with office at New Haven, Conn., has been announced in these columns, was born on March 26, 1866, at Columbia, Conn., and began railway work in 1882 as night operator on the New York & New England at Franklin, Mass., and has been in the continuous service of that company, its successor, the New York, New Haven & Hartford, ever since. In 1886 he was promoted from the position of operator to train despatcher, and from 1892 to 1897 was chief train despatcher. He became assistant superintendent in 1897, and on January 14, 1899, was appointed superintendent of the Midland division of the New York, New Haven & Hartford; in May, 1903, he was appointed also superintendent of the Providence division. He was later made superintendent of the Shore Line division, which position he held at the time of his recent appointment as general superintendent of the same road, as above noted.

Benjamin R. Pollock, who has been appointed general manager of the New York, New Haven & Hartford, with office at New Haven, Conn., as has been announced in these columns, was born on January 2, 1865, at Lansford, Pa. He was educated in the public schools, and began work with the Lehigh Coal & Navigation Company in 1879 as an operator, remaining until 1881, when he went to the New York & New England, which later became the New England Railroad and was absorbed in 1898 by the New York, New Haven & Hartford. From 1881 to 1898 he was consecutively telegraph operator, train despatcher, chief despatcher, trainmaster and assistant superintendent. In 1898 he was appointed assistant superintendent of the Highland division of the New York, New Haven & Hartford, remaining in that position until January, 1904, when he became superintendent of the Air Line Northampton division of the same road at New Haven. The following December he was made superintendent of the Highland division and later was appointed superintendent of the Midland division. Since October, 1909, he has been general superintendent of the same road, with office at New Haven.



B. R. Pollock.

J. D. Gallary, who has been appointed superintendent of the Providence division of the New York, New Haven & Hartford, with office at Providence, R. I., as has been announced in these columns, was born at Lake View, N. Y., on July 31, 1874, and when he was 13 years old became a messenger boy on the Erie Railroad at Buffalo. He then attended school until 1890, when he went to the Pennsylvania Railroad as a telephone boy. In December of the same year he became a telegraph operator on the same road, and shortly after went to the Lehigh Valley as operator and clerk. From 1892 to 1894 he was operator on the Chicago & North Western and the Chicago, Milwaukee & St. Paul, and then returned to the Lehigh Valley in the same capacity. His next position was brakeman, and later conductor on the Delaware, Lackawanna & Western, then for several years he was assistant yardmaster and yardmaster on the Lake Shore & Michigan Southern. From 1903 to December, 1905, he was general yardmaster of the Rock Island, at Rock Island,

Ill., and from January, 1906, to December, 1907, was general yardmaster of the Northern Pacific at Duluth. In 1907 he went to Providence as assistant superintendent and trainmaster of the New York, New Haven & Hartford.

V. A. Riton, who has been appointed general superintendent of the eastern general division of the Norfolk & Western, with headquarters at Roanoke, Va., as has been announced in these columns, was born at Johnstown, N. Y., and was educated at Johnstown Academy, in his native town. He began railway work in 1872 and previous to 1875 was consecutively rodman, leveler, and assistant engineer on construction of the New York & Canada Railway for the Delaware & Hudson Canal Co. From 1877 to 1879 he was assistant engineer of the Plattsburg & Dannemora, now a part of the Delaware & Hudson. For a short time in 1879 he was assistant engineer of the Chicago & Northwestern and the same year was appointed assistant engineer of the Chicago, Milwaukee & St. Paul. He was promoted in 1882 to roadmaster of the Mineral Point division of the same road and later was transferred in the same capacity to the Chicago division. From January, 1895, to November, 1898, he was superintendent of the Cascade division of the Great Northern at Leavenworth, Wash. The following December he went to the Norfolk & Western as superintendent of the Scioto division at Kenova, W. Va., and has been in the continuous service of that road ever since. From June, 1901, to November, 1903, he was superintendent of the Pocahontas division at Bluefield, W. Va., and from November, 1903, to March, 1904, he was in the president's office. He was then appointed superintendent of the Shenandoah division at Roanoke, Va., and on August 16, 1905, was made superintendent of the Norfolk division at Crewe, Va., which position he held at the time of his recent appointment as general superintendent of the same road, as above noted.

Traffic Officers.

Howard C. Tucker has been appointed traveling coal freight agent of the Baltimore & Ohio, with headquarters at Uniontown, Pa.

C. L. Parker has been appointed commercial agent of the Seaboard Air Line, with office at Richmond, Va., succeeding G. H. Parater, resigned to accept service elsewhere.

W. H. Knox, traveling freight agent for the Nashville, Chattanooga & St. Louis, at Nashville, Tenn., has been appointed commercial agent, with office at Nashville, succeeding W. L. Nichol, promoted.

E. F. McDaneld has been appointed freight and passenger agent of the Chicago & Alton, with office at Salt Lake City, Utah. Al. J. Wyant has been appointed traveling freight agent, with headquarters at Pittsburgh, Pa., in place of J. H. Walkmeyer, promoted.

P. L. Markey has been appointed division freight and passenger agent of the Chicago, Milwaukee & St. Paul, with office at Ottumwa, Ia., succeeding W. C. Parker, who has been transferred to Cedar Rapids, Ia., in a similar capacity in place of C. J. Mikesh, resigned to engage in other business. C. J. Peterson has been appointed commercial agent, with headquarters at Minneapolis, Minn., to succeed C. B. Wilser, resigned to engage in other business. E. H. Spence succeeds Mr. Peterson as commercial agent at Cincinnati, O.

Engineering and Rolling Stock Officers.

G. C. Millett, engineer of the Atchison, Topeka & Santa Fe Coast Lines, at Los Angeles, Cal., has been appointed assistant to chief engineer.

J. J. Waters has been appointed superintendent of motive power of the Pere Marquette, with headquarters at Grand Rapids, Mich., to succeed W. L. Kellogg, resigned.

G. E. Perry, master mechanic of the Missouri, Oklahoma & Gulf, has been appointed superintendent of motive power, with headquarters at Muskogee, Okla., and the former position is abolished.

W. M. Vandersluis, formerly sales engineer in the Chicago office of the Union Switch & Signal Company, has been appointed signal engineer of the Illinois Central, succeeding N. E. Baker, resigned. Effective December 16.

W. L. Kellogg, superintendent of motive power of the Pere Marquette, at Grand Rapids, Mich., has been appointed superintendent of machinery and equipment of the Missouri, Kansas & Texas, with headquarters at Parsons, Kan., succeeding William O'Herin.

Thomas Bernard, engineer maintenance of way of the Northern district of the Southern Railway at Greensboro, N. C., has been appointed assistant to chief engineer in the office of chief engineer maintenance of way and structures, with headquarters at Greensboro, and W. T. Dobyns succeeds Mr. Bernard.

Purchasing Officers.

F. A. Bushnell, purchasing agent of the Spokane, Portland & Seattle, at Portland, Ore., has been appointed assistant purchasing agent of the Great Northern, with headquarters at St. Paul, Minn.

Special Officers.

E. D. Stratton, commercial agent of the Southern at Evansville, Ind., has been appointed land and industrial agent of the Cincinnati, New Orleans & Texas Pacific and the Alabama Great Southern, with headquarters at Chattanooga, Tenn., succeeding T. O. Plunkett, who has been appointed manager of the farm improvement department of the Southern Railway and affiliated lines, with headquarters at Atlanta, Ga.

OBITUARY.

F. H. Bainbridge, formerly principal assistant engineer of the Chicago & Northwestern, with headquarters at Chicago, and later resident engineer, died at Ravenswood, Chicago, December 3, at the age of 49 years.

James M. Shanley, a well-known civil engineer, of Montreal, Que., and formerly chief engineer of the Baie des Chaleurs, now a part of the Quebec Oriental, died at his home in Montreal, on November 27, at the age of 55. Mr. Shanley had been connected with the construction of many new railway lines in the Dominion of Canada. He was a member of the council of the Canadian Society of Civil Engineers and was also a member of the Engineers' Club.

John Strode Barbour Thompson, formerly assistant to the president of the Southern, died at a hospital in Richmond, Va., on December 11, after an extended illness. He was born on June 10, 1858, in Culpeper county, Virginia, and began railway work in July, 1878. In December, 1910, he resigned from the position of assistant to the president of the Southern to become president of the Atlantic Compress Company.

Alfred Pancoast Boller, president of the American Institute of Consulting Engineers and one of the best known bridge builders, died on December 9, at his home, in East Orange, N. J., after a year's illness at the age of 73. He was born at Philadelphia, Pa., and graduated from the University of Pennsylvania in 1858 and received his engineering degree from Rensselaer Polytechnic Institute, Troy, N. Y., in 1861. He was for a time on the engineering force of the Lehigh Canal, and in 1863 became associated with the staff of the Philadelphia & Erie. He was chief engineer for the Hudson River Railroad for a short time, and then entered the iron business with Samuel Milliken as the New York agents of the Phoenix Iron Company. From 1870 to 1890 he was with the Phillipsburg Manufacturing Company, and during the same period he was consulting engineer for railroad building in Hayti and Cuba, chief engineer for the Manhattan Elevated Railway and consulting engineer for the Department of Public Parks of New York City. Mr. Boller entered into partnership with Henry W. Hodge in 1898, and they became consulting engineers for the Mexican National Railroad. The firm also was concerned in the construction of the Ninety-sixth street viaduct, New York City; the stone bridge over the Connecticut river, at Hartford, Conn.; the Singer and the Metropolitan tower buildings and the Wabash Railroad entrance into Pittsburgh, with the cantilever bridges over the Ohio and Monongahela rivers. Mr. Boller was a member of the Institute of Civil Engineers of London, the New York Chamber of Commerce, the Century Association and Railroad Club, of New York City; the Pennsylvania Society and the New England Society, of Orange, N. J.

Equipment and Supplies.

LOCOMOTIVE BUILDING.

THE BIRMINGHAM & SOUTHERN is in the market for two locomotives.

THE CHESAPEAKE & OHIO is in the market for from 25 to 50 locomotives.

THE ILLINOIS CENTRAL has ordered 30 mikado locomotives and 25 Pacific type locomotives from the American Locomotive Company.

THE SOUTHERN RAILWAY has ordered 7 Pacific type locomotives from the American Locomotive Company. The dimensions of the cylinders will be 24 in. x 28 in.; the diameter of the driving wheels will be 72½ in., and the total weight in working order will be 233,000 lbs. These locomotives will be equipped with superheaters.

CAR BUILDING.

THE BALTIMORE & OHIO is in the market for 8 postal cars.

THE NORFOLK SOUTHERN is in the market for 300 box cars and 200 flat cars.

THE CUMBERLAND & PENNSYLVANIA is making inquiries for 100 steel underframes.

THE BUFFALO, ROCHESTER & PITTSBURGH is in the market for 1,000 composite gondola cars.

THE CHICAGO, ROCK ISLAND & PACIFIC is making inquiries for 500 50-ton steel floor drag bottom gondola cars.

THE NEW YORK CENTRAL LINES have ordered 1,000 gondola cars from the American Car & Foundry Company.

THE CENTRAL OF NEW JERSEY has ordered 12 vestibule coaches and 9 combination passenger cars from the Harlan & Hollingsworth Corporation.

THE CHICAGO, BURLINGTON & QUINCY has ordered 1500 gondola cars from the American Car & Foundry Company, and 1,000 gondola cars from the Haskell & Barker Car Company.

THE LAKE SHORE & MICHIGAN SOUTHERN has ordered 1,000 hopper cars from the American Car & Foundry Company. This order was mentioned in the *Railway Age Gazette* of December 6 as being for the Pittsburgh & Lake Erie.

THE PITTSBURGH & LAKE ERIE, mentioned in an unconfirmed item in the *Railway Age Gazette* of December 6 as having ordered 3,000 hopper cars, has ordered 2,000 hopper cars, which will be equally divided between the Pressed Steel Car Company and the Standard Steel Car Company.

THE PENNSYLVANIA RAILROAD has ordered 500 gondola cars from the Pressed Steel Car Company, 500 gondola cars and 200 coke cars from the American Car & Foundry Company, 700 coke cars from the Cambria Steel Company, 500 gondola cars from the Ralston Steel Car Company, and 600 coke cars from the Standard Steel Car Company.

IRON AND STEEL.

THE PHILADELPHIA & READING has ordered 10,000 tons of rails from the Pennsylvania Steel Company, 5,000 tons of rails from the Lackawanna Steel Company, 5,000 tons of rails from the Bethlehem Steel Company, and 4,000 tons of rails from the Carnegie Steel Company.

SIGNALING.

The Chicago, Indianapolis & Louisville is now installing automatic block signals on 135 miles of its line. During the coming year a mechanical interlocking plant of 15 levers will be put up at Haskells, Ind., the crossing with the Grand Trunk.

The Alabama Great Southern (Queen & Crescent) plans during the coming year to put the whole of its lines under the block system. At present 112 miles of the line is worked by automatic block signals and 98 miles by non-automatic. The new work will include seven miles of automatic block signals, on double track, and 73 miles of manual blocking on single track.

Supply Trade News.

W. M. Vandersluis, formerly sales engineer of the Union Switch & Signal Company, Swissvale, Pa., with office in Chicago, has been made signal engineer of the Illinois Central, effective December 16.

L. H. Mesker, manager of the St. Louis office of Manning, Maxwell & Moore, Inc., New York, resigned that position to become manager of the St. Louis office of the Ferro Machine & Foundry Company, Cleveland, Ohio, effective January 1.

Marvin F. Wood, general sales manager of the Van Nest Company, New York, has resigned. He has not yet decided what kind of goods he will handle, but he intends to continue to sell railway supplies, just as he has been doing for more than 20 years.

The H. W. Johns-Manville Company, New York, has opened a branch office at 31½ South Broad street, Atlanta, Ga., in charge of C. S. Berry as manager. To facilitate delivery in the South a stock of roofings, pipe coverings and other J.-M. asbestos, magnesia and electrical products is carried at that office.

For a quarter of a century the general office and Chicago laboratories of Robert W. Hunt & Co. have been in the Rookery. Owing to inability to secure in that building the necessary space in which to conduct their very largely increased business, the offices and laboratories were moved on December 1 to the twenty-second floor of the Insurance Exchange building, Jackson boulevard, between Sherman street and Fifth avenue, where the company will have ample space for its offices and both chemical and cement laboratories.

George Burnham, one of the former owners of the Baldwin Locomotive Works, died at his home in Philadelphia, Pa., on December 10 at the age of 96. Mr. Burnham was born in Springfield, Mass., in 1816 and went to Philadelphia when he was 15 years old. Soon after this he became a bookkeeper for Mathias W. Baldwin, who had entered the business of building locomotives. After Mr. Baldwin's death Mr. Burnham became senior member of the firm of Burnham, Parry, Williams & Co., which in 1909 was incorporated as the Baldwin Locomotive Works. Mr. Burnham retired from business in 1909 after a connection with the firm of 73 years.

The reorganization committee of the Allis-Chalmers Company, Milwaukee, Wis., has called a third assessment of $3 on the common stock and $6 on the preferred stock. The assessment is payable January 15. There still remains to be paid $4 on the common and $8 on the preferred. The court has ordered that the foreclosure sale of the Allis-Chalmers properties takes place February 3. Up to date there have been deposited under the plan of reorganization $10,458,000 first mortgage 5 per cent. bonds, or 93 per cent. of the outstanding issue, $14,146,500 7 per cent. cumulative preferred stock, or 88 per cent. of the outstanding issue, and $17,215,600 of the common stock, or 86 per cent of the outstanding issue.

TRADE PUBLICATIONS.

ASPHALT.—The Standard Asphalt & Rubber Company has issued a mailing card, entitled "Look for the Trade Mark."

SAN PEDRO, LOS ANGELES & SALT LAKE.—The passenger department has issued an attractive folder on "California in Winter."

CEMENT.—The Universal Portland Cement Company has issued an attractive colored calendar for 1913, illustrated with excellent views of many structures in which Universal cement has been used.

BRAKEBEAMS.—The Chicago Railway Equipment Company has issued Vol. 1, No. 1, of a little magazine called *Safety First*, edited by Bruce V. Crandall, which uses the "safety first" movement on the railways as an argument for the use of safety appliances.

BLUEPRINTING.—The C. F. Pease Company has issued an attractive 32-page booklet, entitled Everything for Blueprinting, describing and illustrating various types of the Pease peerless blueprinting machines and equipment, the Pease simplex and duplex paper coating machines and washing and drying machines and other equipment for use in the handling of blueprints.

Railway Construction.

Atlantic & Western.—This company is building an extension from Lillington, N. C., east, about 40 miles. It has not yet been definitely determined whether Goldsboro or Mount Olive will be the eastern terminus.

Blakely Southern.—This company, which operates a line from Blakely, Ga., south to Jakin, has projected an extension from Blakely north to Bluffton, 11 miles, and on the southern end from Callafield to Donalsonville, 20 miles.

Dallas, Corsicana & Palestine.—Incorporated in Texas with $400,000 capital and office at Palestine. The plans call for a line from Palestine northwest through Anderson and Navarro counties to Corsicana, and it is understood that construction work is to be started at once. The incorporators include: G. J. Heflin Corsicana; T. Royal C. W. Hanks W. B. Flanagan, Palestine; L. E. Mitchell, Neosho, Mo.; K. Brent, T. T. Crittenden, Jr., Kansas City, Mo.

Denver, Northwestern & Pacific.—A grading contract has been given to M. A. Wogan, Denver, Colo., for work from Steamboat Springs, Colo., west to Craig, 42 miles. (November 22, p. 1013.)

Eastern Texas Traction.—An officer writes that a contract has been given to Karner Brothers, Dallas, Tex., to build from Dallas northeast via Garland, Rockwall, Fate, Royse City, Josephine and Caddo Mills to Greenville, about 50 miles. The maximum grade will be 2 per cent., and maximum curvature 2 deg. The work will be heavy at Rockwall and between Garland and Dallas. There will be four steel bridges each 100 ft. long. There will be 2,200 ft. of reinforced concrete viaducts at the east fork of the Trinity river. F. E. Wright, president; W. A. Obenchain, Jr., chief engineer, 1307 Commerce street, Dallas. (September 27, p. 599.)

El Paso Electric Railway.—According to press reports, the Stone & Webster Management Association of Boston, Mass., will build from El Paso, Tex., along the Rio Grande valley to Fabens, about 35 miles.

Intercolonial Railway.—An officer writes that this company has finished work on 8.3 miles of new line in the province of New Brunswick from Nelson to a point two miles east of Chatham to replace the old line between these two places. Work is now under way between Georges River and Sydney Mines on nine miles.

Laurel Fork.—Work is now under way building an extension from Frog Level, Tenn., to Laban, 3 miles.

Mexico Tramway Company.—On the line under construction from Mexico City to Toluca, 45 miles, the first section from Mexico City to Coazimalta has been finished, it is said, and over 800 men are now at work on the remainder of the line. Work on the line between Mexico City and Puebla has been largely suspended, owing to the disturbances caused by bands of rebels near the route. This line is to be about 130 miles long.

Nevada, Lebanon & Eastern.—Incorporated in Missouri with $1,000,000 capital, to build a line from Nevada, Mo., east via Stockton, Bolivar, Polk and Buffalo, to Lebanon, 100 miles. The stockholders include: J. A. Daly and S. A. Wright, Nevada; R. A. Brown, C. W. Vilas, J. B. O'Bannon and S. J. and W. A. Thompson.

New York Connecting Railroad.—See New York, New Haven & Hartford.

New Iberia, Lafayette & Northeastern.—An officer writes that surveys are now being made to build the line projected some time ago from New Iberia, La., to Eunice, 52 miles. H. A. Genung, chief engineer, New Iberia. (March 29, p. 780.)

New York, New Haven & Hartford.—The report of this company for the year ended June 30, 1912, shows that construction work has been authorized on the Harlem River branch to permit the connection of the New York Connecting Railroad with the Harlem River branch at Port Morris, N. Y., and this work will be carried out coincidentally with the construction work on the Connecting Railroad. At Van Nest a modification of the existing yard tracks, with construction of repair shop, inspection shed and auxiliary facilities for handling electric locomotives and cars, is under construction, and at the Westchester yard the construction of receiving tracks and new west entrance to the yard for the classification of cars floated to Oak Point, together with transfer platforms and additional track is well under way. Double-tracking work has been completed between Hawleyville, Conn., and Shelton, and this improvement provides a double track line from Naugatuck Junction to Hopewell Junction, 68.44 miles. In connection with the line and grade revisions made, 12 new steel railroad bridges and eight highway bridges have been placed and 16 grade crossings have been eliminated. Work is well under way on an enlargement of the Cedar Hill classification yard, also of the departure yard, together with a change of the storage yard on the Air Line division to a classification yard. The filling of the Lyman and Rapello viaducts, east of Middletown, for double track roadbed, with construction of concrete culverts to provide necessary waterways under the embankments has been started. About 1,000,000 cu. yds. of filling will be placed by the company's forces. Improvements to line are being made at Westerly, R. I., including provision for future four-tracking; putting up new passenger and freight stations; passenger subway; abolition of one grade crossing and new bridges. Progress has been made during the year on the construction of double-track on sections of the line between Providence and Fall River, together with the elimination of grade crossings. It is expected that the negotiations in connection with the elimination of grade crossings at Rumford will soon be successfully concluded, and the laying of second track is now under way between East Providence and East Junction. Work is about finished on the extension of the east freight yard at New Bedford, Mass., and the company's portion of the work in connection with the elimination of grade crossings at Worcester, Mass., is about finished, the work still to be done depending upon the completion of the work of other companies. The new coach yard and engine facilities, as well as the double-track connections between the Norwich & Worcester and the Providence & Worcester railroads are nearing completion. At Boston, Harrison square to Atlantic and Savin Hill to Neponset the work includes the elimination of grade crossings and the construction of third and fourth tracks; nine grade crossings have been eliminated and the tracks are elevated and in service from Savin Hill to Neponset. Three passenger subways have been built; the station grounds and freight yards have been enlarged or improved and new stations have been put up. During the year 81 sidetracks to serve industries along the company's line were constructed, and a number of passing sidings have been installed to permit double-track operation from Bristol to Hartford, and work is authorized or contemplated on a number between New Haven and Springfield, and between Providence and New London. A number of sections of the New York, Westchester & Boston were completed and placed in operation during the year, and the line is now in operation from Willis avenue, at 133d street, New York, to White Plains and New Rochelle. Work is also progressing on the New York Connecting Railroad. Contracts have been let for the steel work for the Big Hell Gate bridge and Ward's and Randall's Island viaduct, for steel work for Little Hell Gate and Bronx Kill bridges and approach viaducts, for masonry of Bronx viaducts, for foundation and masonry work of Eastern viaduct, for tower bases East river bridge and for excavation and masonry from Woodside avenue to Stemler street. This line is being built jointly with the Pennsylvania Railroad. It has been decided to improve the facilities of the Boston & Providence Railroad by the construction of two additional main line tracks from Boston to East Junction, also to eliminate the grade crossings and to adopt and equip the whole main line, thus four-tracked for operation by the use of electricity as the motive power. The most important work carried out by the electrical department during the fiscal year included the extension of the Cos Cob power station; the electrification of Harlem River branch main line, yards and sidings, and electrification of yards and sidings, Woodlawn to Stamford, and the electrification of the New York, Westchester & Boston. Work is also well under way on the extension of electrification from Stamford to New Haven.

NEW YORK, WESTCHESTER & BOSTON.—See New York, New Haven & Hartford.

OBERLIN, HAMPTON & EASTERN.—An officer writes that this company has projected a 4-mile extension south to Elton, La., also a 16-mile extension northeast towards Pine Prairie.

SUGAR LAND RAILWAY.—An officer writes that this company owns and operates 32.72 miles of main line from Cabell, Tex., in Fort Bend county, to Otey in Brazoria county, the line from Burnsides to Arcola having been abandoned and the line extended from Burnsides to Otey. The company has located an extension from Cabell to Rodgers, 24.1 miles. (June 28, p. 1627.)

UNION PACIFIC.—Work is now under way on the line projected some time ago from Gering, Neb., west towards Medicine Bow, Wyo., on the section from Gering to Mitchell, 10 miles. The Kilpatrick Brothers & Collins Contracting Company has the contract. Work is also under way laying second track from Herdon, Neb., to Dix, 14.28 miles, and from Kimball, Neb., to Pine Bluffs, 21.04 miles.

UNITED VERDE & PACIFIC.—This company has projected an extension from Jerome, Ariz., to the Verde tunnel, 6 miles.

WASHINGTON & GREAT FALLS RAILWAY & POWER COMPANY.—An officer writes that work is now under way on a 10-mile line west from Bethesda, Md. There will be a 50 ft. bridge, also a 40 ft. bridge and five other smaller bridges. Track has been laid on 2½ miles. The Pittsburgh Construction & Supply Company, Washington, D. C., has the contract. Henry E. Carr, president, Baltimore.

RAILWAY STRUCTURES.

ANSONIA, CONN.—The report of the New York, New Haven & Hartford for the year ended June 30, 1912, shows that a four span reinforced concrete bridge over the Naugatuck river and the company's tracks at Bridge street, Ansonia, is under construction and is expected to be finished this year. At New York new piers, Nos. 39, 40 and 41, have been completed, and at Oak Point an office building and storehouse with facilities for the inspection of electric locomotives is under way, and will be completed during the year. A new 43-stall brick and concrete roundhouse at Cedar Hill, Conn., with machine shop, power house, locomotive coaling plant and ash handling facilities, storehouse and water supply is about finished. A new steel bridge to replace the present structure over the track at Ferry street, which will allow for a future eight track layout under the bridge, has been completed and is now in service, and excavation of a portion of the site of the proposed New Haven station is under way. Contracts have been let for building a passenger station at Westerly, R. I. Grade crossings are to be eliminated on the line from East Providence to East Junction, also at Worcester, Mass. At Readville, Mass., a 200 foot extension of the locomotive shop has recently been authorized and is expected to be finished next year. Work has been started on an extension of the present company's Cos Cob station. This extension of the station completes the power plant, whose capacity is sufficient to handle all trains in the zone of electrification, inclusive of the New York, Westchester & Boston between New York, Harlem River and New Haven. To provide increased office facilities at South Station, Boston, an addition to the building has been made by the Boston Terminal Company at a cost of $425,000.

CHATHAM, VA.—The Southern Railway is building a combined freight and passenger station and making other improvements at Chatham, including the construction of a new 100,000 gal. capacity water tank. The new station is to be 30 ft. x 161 ft., a contract for the work has been given to the Elliot Building Company, Hickory, N. C.

GALLUP, N. MEX.—The Atchison, Topeka & Santa Fe is planning to erect a 36-stall roundhouse, shops and a passenger station at this point.

NORRIS, S. C.—The Southern Railway is asking for bids for putting up a combined passenger and freight station at Norris. The building is to be 28½ ft. x 69⅓ ft., with tile roof, and the work is to be started at an early date.

Railway Financial News.

CANADA SOUTHERN.—This company has issued $22,500,000 consolidated guaranteed (by the Michigan Central) 50-year 5 per cent. bonds of a total authorized issue of $40,000,000 bonds, of the remainder of which $3,000,000 yearly may be issued to provide for improvements and extensions. J. P. Morgan & Co., New York, are offering holders of the first mortgage 6 per cent. bonds of the Canada Southern, due January 1, 1913, and the second mortgage 5 per cent. bonds of the Canada Southern, due March 1, 1913, to exchange their bonds for new consolidated 5 per cent. bonds on a basis which will yield 4.70 per cent. interest on the new investment. Holders must deposit the 6's by December 20, and the 5's by January 9, to avail themselves of this offer. Holders not desiring to make the change will receive cash for their bonds on date of maturity.

CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.—This company, which was authorized on August 20 to sell $1,578,000 bonds at 92, has been authorized to sell these bonds at 90, it having been found impossible to sell them at 92.

COLORADO MIDLAND.—See Denver & Rio Grande.

COLORADO & SOUTHERN.—The directors have declared an annual dividend of 1 per cent. on the common stock. For the last four years heretofore, annual dividends of 2 per cent. have been declared at this time. The dividend is payable December 31.

DENVER, LARAMIE & NORTHWESTERN.—Bondholders are understood to have agreed to the issue of $375,000 receiver's certificates to pay for building the road from Greeley to Severance, Col.

DENVER & RIO GRANDE.—This company has bought, the *Commercial & Financial Chronicle* says, at 55 the $737,150 Grand Junction Railway stock, forming part of the collateral for Colorado Midland notes.

GULF, FLORIDA & ALABAMA.—Megargel & Co., New York, are offering $1,500,000 first mortgage 5 per cent. bonds of 1911-1961 at 90. The road runs from Pensacola, Fla., to Local, Ala., 72 miles, and is part of a road under construction from Pensacola to the mineral district of Alabama. The sale of the above mentioned bonds is to furnish funds for completing the 78 miles of road from Local to a connection with the Southern Railway at Pine Hill. The company owns a right-of-way from Pensacola to Tuscaloosa, Ala., 236 miles.

INTERNATIONAL & GREAT NORTHERN.—T. J. Freeman, president of the International & Great Northern, is quoted in the Houston *Chronicle* as saying: "The purchase of the control of the International & Great Northern by the Missouri Pacific people would not be a merger nor a consolidation, but merely a sale. Stock would be sold from one company of stockholders to new stockholders. The Goulds control the board of directors of the Missouri Pacific. Should the Gould interests dispose of their International & Great Northern holdings to the directors of the Missouri Pacific, it would not affect their control of the Missouri Pacific system and they would still control the International & Great Northern as a part of the system. . . . Should the Missouri Pacific get control of the International & Great Northern it would not be the first out of state railroad to own stock in a Texas railroad.

LOUISVILLE & NASHVILLE.—See an item in regard to this company's contract with the Western Union in General News.

MICHIGAN CENTRAL.—See Canada Southern.

MIDLAND CONTINENTAL.—Spitzer, Rorick & Co., Chicago, are offering $400,000 6 per cent. collateral trust notes at a price to yield 5.75 per cent. The notes are secured by $1,850,000 first mortgage 5 per cent. bonds, and by $1,850,000 preferred stock and the same amount of common stock. The road is in operation from Edgely to Jamestown, N. D., about 45 miles. The proceeds of the notes are to be used to pay for the building of the line from Jamestown to Wimbledon, 25 miles. The bonds securing the notes will themselves be secured by a first lien on the 70 miles of road when completed. The road is built with 65-lb. rails, douglas fir ties and with a maximum grade of .6 of 1 per cent.

[ADVERTISEMENT.]

ANNUAL REPORT

NEW YORK, NEW HAVEN & HARTFORD RAILROAD COMPANY.

The Income Account of *The New York, New Haven & Hartford Railroad System, except the New York, Ontario & Western Railway, the Boston & Maine Railroad, and the Maine Central Railroad Company, for the fiscal year ending June 30, 1912, shows the following result:

REVENUE:	
Freight	$38,974,455.89
Passenger	43,932,341.77
Mail	698,418.04
Express	3,240,382.75
Other Transportation Revenue	825,594.64
Revenue other than Transportation	1,955,855.58
Electric Light	204,416.96
Electric Power	619,055.05
Gas	175,952.29
Water	15,432.16
Total Revenue	$90,641,905.13
LESS OPERATING EXPENSES	59,407,632.47
NET OPERATING REVENUE	31,234,272.66
NET REVENUE FROM OUTSIDE OPERATIONS	1,383,449.31
TOTAL NET REVENUE	$32,617,721.97
Accrued Taxes	4,949,094.53
OPERATING INCOME	27,668,627.44
Income from Other Sources	4,787,486.75
TOTAL INCOME	$32,456,114.19
DEDUCTIONS FROM INCOME:	
Rentals of Leased Roads	$5,062,526.40
Interest on Bonds	3,310,496.03
Interest on Convertible Debentures	2,665,307.35
Interest on Debentures	4,627,272.73
Other Interest	1,298,731.16
Rentals other than above	2,197,014.22
Miscellaneous	379,262.99
Total Deductions from System's Combined Earnings	$19,540,610.88
TOTAL NET EARNINGS OF N. Y., N. H. & H. R. R., INCLUDING EARNINGS OF SUBSIDIARY COMPANIES	$12,915,503.31
DIVIDENDS PAID N. Y., N. H. & H. R. R. STOCKHOLDERS OTHER THAN SUBSIDIARY COMPANIES	12,609,668.00
SURPLUS	$305,835.31

*All of the Stock of the Companies comprising the System is in the Treasury of The New York, New Haven and Hartford Railroad Company except 316 shares Preferred Stock and 280 shares Common Stock of the Central New England Railway Company.

In view of the existing apprehension that the Company's policy in the matter of acquisition of various properties during the past eight years is imposing an undue burden upon its resources, it seems fitting at this time to again direct attention to the fact that the General Statements, or annual reports, hitherto published, with few exceptions, have been for The New York, New Haven and Hartford Railroad Company alone and have followed closely the returns required to be filed by it as a corporation under Federal and State laws. Consequently, such statements could not and did not reflect the true financial and operating results of the System as a whole as the income of the parent company included only such portion of the earnings of subsidiary companies as was received in the form of dividends upon the capital stocks of those companies in the treasury of the parent company. Furthermore, the conservative policy of your Board in establishing and building up out of the expense accounts reserve funds for fire losses, personal injuries, coal insurance and marine insurance has had the effect of understating the real net income of the System. This year's General Statement, as did that of 1911, contains a System Income Account and Balance Sheet and explanatory Exhibits and it is the purpose to continue to furnish such information. It will be of interest to note the following comparison of the results as reported with those of the System as a whole, including in the latter the undivided surplus earnings of the several companies:

SURPLUS NET INCOME IN EXCESS OF DIVIDENDS PAID.

	As reported for N. Y., N. H. & H. R. R. Co.	*System.*
1905	$ 308,052.44	$ 901,215.12
1906	3,718,285.41	4,506,621.89
1907	2,217,841.81	1,770,277.87
1908 (Deficit)	2,516,692.85	(Deficit) 2,560,866.87
1909 (Deficit)	453,613.02	85,606.16
1910	1,037,793.35	2,711,033.97
1911 (Deficit)	1,267,539.99	456,712.98
1912 (Deficit)	903,228.92	305,835.31
Total for eight years	$2,140,898.23	$8,176,436.43

So that the real Surplus net income of the System in excess of dividends paid was $8,176,436.43 instead of $2,140,898.23 as reported for The New York, New Haven and Hartford Railroad Company proper, a difference of $6,035,538.20, of which $3,533,022.09 represents the amount of the various funds, and $2,502,516.11 the undivided surplus earnings of subsidiary companies. The disposition of the $8,176,436.43 was as follows:

Contributions to and accretions of the Funds	$3,533,022.09
Appropriated for Improvements and Betterments	3,000,000.00
Carried to Profit and Loss Accounts	1,643,414.34
	$8,176,436.43

Regardless of the very liberal advances made during the past two years in the wages paid to employes, the management is now confronted with demands for further advances from engine and other forces, which were made concurrently by similar employees of other eastern railroads to their respective managements. Consideration at this time has only been given to those in the engine service. The management feels that this class of employes is already well and sufficiently paid and that the business conditions coupled with the inability of the Company thus far to secure an offsetting increase in its freight rates do not justify the assumption of further burdens which may jeopardize the returns to stockholders.

As a result of prolonged discussion it was deemed advisable to join with the other roads concerned in submitting the matter to arbitration. Each side to the controversy has presented its case and a decision of the arbitrators is momentarily expected. Pending this decision consideration of the demands of other classes of employes has been deferred.

The following is a statement of the important construction, improvement and maintenance work undertaken during the year:

HARLEM RIVER BRANCH: Construction work has been authorized to permit the connection of the New York Connecting Railway with the Harlem River Branch at Port Morris and will be undertaken coincidently with the construction work of the Connecting Railroad.

At Van Nest a modification of the existing yard tracks, with construction of repair shop, inspection shed and auxiliary facilities for handling electric locomotives and cars are under construction and should be completed during the ensuing year.

At Oak Point the construction of an office building and storehouse with facilities for the inspection of electric locomotives is under way and will be completed during the year.

At Westchester Yard the construction of receiving tracks and new west entrance to the yard for the classification of cars floated to Oak Point and for the relief of congestion at that point together with transfer platforms and additional tracks is under way and will be completed as rapidly as conditions permit.

NEW YORK CITY: The new piers, Nos. 39, 40 and 41, East River, have been entirely completed and are in service.

HAWLEYVILLE TO SHELTON—DOUBLE TRACKING: This work has been continued during the year and sections of second track have been placed in service from time to time as completed. The entire work is now completed, making a complete double track railroad from Naugatuck Junction to Hopewell Junction, a distance of 68.44 miles. Twelve new steel railroad bridges and eight highway bridges have been placed, sixteen grade crossings have been eliminated in connection with the line and grade revisions made.

ANSONIA: A four span reinforced concrete bridge over the Naugatuck River and the Company's tracks at Bridge Street is under construction and should be completed this year. The work is being done under agreement with the City of Ansonia and will effect the elimination of the very important and much used grade crossing of Bridge Street.

NEW HAVEN AND CEDAR HILL: A new forty-three stall brick and concrete roundhouse at Cedar Hill, with machine shop, power house, locomotive coaling plant and ash handling facilities, storehouse and water supply, is practically complete and can be placed in service as soon as the installation of machinery in the shop has been completed.

An enlargement of the Cedar Hill Classification Yard to a capacity of 408 cars and of the Departure Yard to a capacity of 357 cars together with a change of the Storage Yard on the Air Line Division to a Classification Yard of 354 cars capacity, is under way and should be completed by January 1st, 1913.

The new steel bridge authorized to replace the present bridge over the tracks at Ferry Street, which will provide for the constantly increasing and heavy traffic, and which will allow for a future eight track layout under the bridge, has been completed and is now in service.

Excavation of a portion of the site of the proposed New Haven station is under way, changes in sewers, gas mains, wire lines, etc., have been made; trolley track changes and permanent paving in some of the adjacent streets will be undertaken during this season.

AIR LINE IMPROVEMENT: The filling of the Lyman and Rapello Viaducts, east of Middletown, for double track roadbed, with construction of concrete culverts to provide necessary waterways under the embankments, has been begun. About 1,000,000 cubic yards of filling will be placed by Company forces. The height of the viaduct, 125 feet, will require unusual care in placing material and considerable time to complete.

NIANTIC TO BACK BAY—STONE BALLASTING: This work has been deferred during the year, with the exception of some preliminary changes to permit the economical placing of stone when work is resumed.

WESTERLY, R. I., IMPROVEMENT: Improvement of line, provision for future four-tracking, including new passenger and freight stations, passenger subway, abolition of one grade crossing, new bridges and entire revision of facilities has been undertaken and is progressing favorably. The contract for the passenger station has been awarded and the entire work should be finished before June 30th, 1913. Line revision has been completed and trains are now operating over it and the new bridge over the Pawcatuck River.

PROVIDENCE TO FALL RIVER DOUBLE TRACKING: The construction of double track on portions of the line with elimination of grade crossings, including general line and grade revision, has progressed during the year and is nearly complete. Rehabilitation of and changes in Warren Power Station and East Providence Sub-station have been completed and are in service.

EAST PROVIDENCE TO EAST JUNCTION DOUBLE TRACKING: The negotiations in connection with the elimination of grade crossings at Rumford have been necessarily protracted during the past year, but are now practically consummated. The laying of second track is progressing and the work will be completed this year, if the crossing matters can be closed as expected.

NEW BEDFORD, MASS.: The extension of the east freight yard is practically completed. Tracks have been laid, driveways paved with stone blocks and a fifteen-ton crane erected.

WORCESTER, MASS.: The Company's portion of the elimination of grade crossings under decree of the Court is practically completed; the work still to be done depending upon the completion of the work of other companies.

The new Coach Yard and Engine Facilities, as well as the double-track connection between the Norwich and Worcester and the Providence and Worcester Railroads are nearly done.

At South Worcester Junction a concrete tower and interlocking plant have been constructed and are in service.

READVILLE, MASS.: A 200 foot extension of the Locomotive Shop has recently been authorized and should be completed during the ensuing year.

BOSTON—HARRISON SQUARE TO ATLANTIC AND SAVIN HILL TO NEPONSET—ELIMINATION OF GRADE CROSSINGS UNDER DECREE OF THE COURT AND CONSTRUCTION OF THIRD AND FOURTH TRACKS: Nine grade crossings have been eliminated and tracks are elevated and in service from Savin Hill to Neponset. Three passenger subways have been built, station grounds and freight yards have been enlarged or improved, concrete signal towers have been built at Harrison Square and Savin Hill and automatic block signals are installed from Savin Hill to Atlantic. A new brick and stucco passenger station at Harrison Square, new inbound stations at Popes Hill and Neponset and a new shelter shed at Atlantic have been completed.

The most important pieces of work that have been under prosecution by the Electrical Department during the past fiscal year, are as follows:

(1) Extension of Cos Cob Power Station.
(2) Electrification of Harlem River Branch main line, yards and sidings, and electrification of yards and sidings Woodlawn to Stamford.
(3) Electrification of the New York, Westchester and Boston Railway.
(4) Extension of electrification from Stamford to New Haven.
(5) Elimination of electro-magnetic induction on foreign wires in the electric zone.
(6) Electrical Equipment.

EXTENSION OF COS COB POWER STATION.

April 27th, 1911, ground was broken for the extension of the present Cos Cob Station, to include four 5,000 KVA turbo generators with full complement of steam and auxiliary parts. Current has already been supplied from the terminals of the first generator of the extended plant, and the progress of construction indicates that the remaining sets will be in readiness to supply current by October 1st, 1912. This extension of the station completes the power plant, whose capacity is sufficient to handle all trains—passenger, freight and switching in the zone of electrification, inclusive of the New York, Westchester and Boston Railway, between New York, Harlem River and New Haven.

ELECTRIFICATION OF HARLEM RIVER BRANCH MAIN LINE, YARDS AND SIDINGS, AND ELECTRIFICATION OF YARDS AND SIDINGS WOODLAWN TO STAMFORD.

The electrification system of the main line of the Harlem River Branch is completed and on July 29th electric passenger service was inaugurated between Stamford and Harlem River. The electrification of the yards and sidetracks is expected to be completed and electric switcher operation commenced at an early date.

ELECTRIFICATION OF NEW YORK, WESTCHESTER AND BOSTON RAILWAY.

The electrification of the four-track section of the New York, Westchester and Boston Railway, between 180th Street and South Mt. Vernon, and the two-track section from South Mt. Vernon to Larchmont Junction was completed May 25th, 1912, and electric operation inaugurated May 29th. The entire work of electrification of this road was completed and complete electric operation inaugurated August 3rd.

EXTENSION OF ELECTRIFICATION FROM STAMFORD TO NEW HAVEN.

The work of electrifying the main line tracks, Stamford to New Haven, is well under way and is expected to be completed within the next fiscal year.

ELIMINATION OF ELECTRO-MAGNETIC INDUCTION ON FOREIGN WIRES IN THE ELECTRIC ZONE.

A satisfactory method of practically eliminating electro-magnetic induction on telegraph and telephone wires, has been worked out, and the additional installation necessary, both on the main line, Harlem River Branch and New York, Westchester & Boston Railway, will be pushed as rapidly as possible.

ELECTRICAL EQUIPMENT.

During the year, orders have been placed for multiple unit equipment to the extent of 13 motor cars and 26 trailers, for use in the passenger service on the Harlem River Branch; 3 AC-DC and 36 AC electric freight engines for freight service between Harlem River and New Haven; and 15 electric switch engines for use in the various electrified yards.

NUMBER OF GRADE CROSSINGS ELIMINATED.

State of Connecticut	10
State of Massachusetts	4
Total	14

NEW PASSENGER STATIONS OR IMPROVED FACILITIES have been provided during the year at the following points:

NEW STATIONS.

Bartow, N. Y.	Hayden Rowe, Mass.	Sound View, Conn.
Farm St., Mass.	Neponset, Mass. (eastb'd).	Southbridge, Mass.
Foxboro, Mass.	Point Pleasant, R. I.	South Walpole, Mass.
Harrison Square, Mass.	Popes Hill, Mass.	Terryville, Conn.

IMPROVED FACILITIES.

Atlantic, Mass.	Fields Corner, Mass.	Popes Hill, Mass.
Auburn, R. I.	Forest Ave., Mass.	Readville, Mass.
Bethel, Conn.	Framingham, Mass.	Riverside, R. I.
Bolton, Conn.	Franklin, Mass.	Sharon Heights, Mass.
Botsford, Conn.	Highland, Mass.	South Britain, Conn.
Bournedale, Mass.	Kingston, R. I.	State Line, Mass.
Breakwater, Conn.	Larchmont, N. Y.	Stonington, Conn.
Bridgeport, Conn.	Medway, Mass.	Thompsonville, Conn.
Bristol, Conn.	Mystic, Conn.	Walpole, Mass.
Canton Junction, Mass.	N. Bedford, Mass. (Weld St.).	Warren, R. I.
Caryville, Mass.	New Haven, Conn.	Watertown, Conn.
Casanova, N. Y.	Neponset, Mass.	Whaley Lake, N. Y.
Centerville, Conn.	Newtown, Conn.	Whitman, Mass.
Cliquot, Mass.	North Bellingham, Mass.	Wickford Junction, R. I.
Crescent Park, R. I.	Norwood, Mass.	Woonsocket Junction, Mass.
Cromwell, Conn.	Pelham, N. Y.	Yarmouth, Mass.
Fairmount, Mass.		

NEW PASSENGER STATIONS OR IMPROVED FACILITIES upon which work is under way and will be completed during the ensuing year are as follows:

NEW STATIONS.

Buzzards Bay, Mass.	Falmouth, Mass.	New Preston, Conn.
Esmond, R. I.	Milton, Mass.	Poughquag, N. Y.

IMPROVED FACILITIES.

Ashmont, Mass.	Needham, Mass.	Sharon, Mass.
Bourne, Mass.	Onset Junction, Mass.	South Wellfleet, Mass.
Brewster, Mass.	Provincetown, Mass.	Watertown, Conn.
Darien, Conn.	Randolph, Mass.	Washington, Conn.
East Douglas, Mass.	Riverside, R. I.	West Quincy, Mass.
East Litchfield, Conn.	Sandy Hook, Conn.	West Walpole, Mass.
Lee, Mass.	Saybrook Junction, Conn.	Winsted, Conn.
Manchester, Conn.		Woonsocket, R. I.

NEW FREIGHT HOUSES OR INCREASED FREIGHT FACILITIES have been provided during the year at the following points:

NEW STATIONS.

Esmond, R. I.	Milton, Mass.

IMPROVED FACILITIES.

Allyn's Point, Conn.	Hartford, Conn.	Pittsfield, Mass.
Bantam, Conn.	Lime Rock, Conn.	Quinebaug, Conn.
Botsford, Conn.	Milford, Mass.	Southbridge, Mass.
Bridgeport, Conn.	Neponset, Mass.	Southwick, Mass.
Bristol, R. I.	New Milford, Conn.	Springfield, Mass.
Burnside, Conn.	Newport, R. I.	Torrington, Conn.
Hadlyme, Conn.	New York, N. Y.	Waterbury, Conn.
Harlem River, N. Y.	Norton, Mass.	West Thompson, Conn.
Harrison Square, Mass.	Oak Point, N. Y.	

NEW FREIGHT HOUSES OR INCREASED FREIGHT FACILITIES upon which work is under way, and which will be completed during the ensuing year are as follows:

NEW STATIONS.

Larchmont, N. Y.	Providence, R. I.	Westerly, R. I.
Woonsocket, R. I.		

IMPROVED FACILITIES.

Ansonia, Conn.	East Windsor Hill, Conn.	Putnam, Conn.
Bourne, Mass.	Greene, R. I.	Sandy Hook, Conn.
Bournedale, Mass.	Harris, R. I.	Scotland, Conn.
Boston Freight Terminal.	Medway, Mass.	South Easton, Mass.
Bristol, Conn.	New Bedford, Mass.	Watuppa, Mass.
Centredale, R. I.	New Preston, Conn.	Webster, Mass.
Congamond, Mass.	Plainfield, Conn.	Westchester, N. Y.
		Yarmouth, Mass.

NEW TURNTABLES have been installed during the year at the following points:

Cedar Hill, Conn.	Greenbush, Mass.

SIGNAL AND INTERLOCKING IMPROVEMENTS AND ADDITIONS have been made during the year at the following points:

Bethel, Conn.	Pawtucket, R. I.
Boston, Mass.	Plainville, Conn.
Bridgeport, Conn.	Sharon Heights, Mass.
Buzzards Bay, Mass.	Shelton-Hawleyville, Conn.
Cedar Hill-Springfield.	South Walpole, Mass.
Columbia Junction, Conn.	Valley Falls—Adamsdale Jct.
East Junction, R. I.	Waterbury-Hartford.
East Taunton, Mass.	West Barnstable, Mass.
East Walpole, Mass.	West Farms, N. Y.
Foxboro, Mass.	Westerly, R. I.
Harlem River Branch.	Wrentham, Mass.
Hartford-Burnside.	Wickford Junction, R. I.
New Haven-Cedar Hill.	Various Stations—Installation of derails.
New Rochelle-Larchmont Jct.	

In addition to the above work under construction or finished, the installation of automatic block signals has been authorized and will be started as soon as arrangements can be made, from:

Braintree to Whitman & Cohasset.	Mansfield to New Bedford.
Derby Junction to Waterbury.	New Haven to Stamford.
Hawleyville Junction to Tunnel Junction.	South Framingham to Walpole.
	Walpole to Mansfield.

NEW BRIDGES, BOTH TRACK AND OVERHEAD, BRIDGE REPAIRS, STRENGTHENING AND RENEWALS, to permit heavier loading, have been made as follows:

Atlantic, Mass.	Myricks, Mass.
Blackstone, Mass.	Neponset, Mass.
Botsford, Conn. (3)	New Haven, Conn. (2)
Braintree Highlands, Mass.	Newtown, Conn. (5)
Brayton, Mass. (2)	Northampton, Mass. (2)
Brayton Point, Mass.	Perrins, R. I.
Cedar Hill, Conn.	Randolph, Mass.
City Mills, Mass.	River Point, R. I.
East Junction, Mass.	River St., Mass.
East Litchfield, Conn. (2)	Rumford, R. I. (4)
Fields Corner, Mass. (2)	Shelton, Conn. (3)
Harrison Square, Mass.	Stevenson, Conn.
Hartford, Conn.	Thompson, Conn.
Hawleyville, Conn. (2)	Touisset, R. I.
Highland Lake, Mass.	Walpole, Mass.
Holyoke, Mass.	Weatogue, Conn.
Islington, Mass.	Westerly, R. I.
Monroe, Conn. (2)	West Mystic, Conn.

ADDITIONAL PROTECTION AGAINST FIRE HAZARD has been provided at the following points:

Allyn's Point, Conn.	New Bedford, Mass. (Wamsutta St. Yard).
Botsford, Conn.	South Boston Freight Terminal.
Cedar Hill Yard, Conn.	Watuppa, Mass.
Mansfield, Mass.	

Supplementing the placing of water barrels on wooden bridges completed last year, water barrels are being placed on all commercial trestles.

All shingle roofs are being painted with fireproof paint and platforms are being sheathed as an additional precaution against fire.

TRACK SCALES. General authority has been granted for the installation or renewal of a large number of track and depot scales. Twenty track scales and a number of smaller scales are now being placed under this authority to ensure the correct weighing of merchandise and other freight.

COMMERCIAL SIDETRACKS. Eighty-one sidetracks to serve industries along the Company's lines have been installed during the year and all existing tracks of this class have been provided with derails and other safeguards.

PASSING SIDINGS. A number of passing sidings have been installed to permit double-track operation from Bristol to Hartford and work is authorized or contemplated on a number between New Haven and Springfield, and between Providence and New London, to allow better spacing of trains and permit increased use of the present double-track lines.

CREOSOTED TIES, TIE PLATES AND SCREW SPIKES.

Total number of ties (all kinds) laid during the year..	1,649,231
Total number of ties creosoted, provided with tie plates and screw spikes, laid during the year between New Haven and Woodlawn and on the Harlem River Branch	67,925

RAIL.

There have been laid in main tracks during the year, in both maintenance and construction, 8,373 tons of 100 pound rail, and 11,944 tons of 80, 78, 68 and 90 pound rerolled rail.

New equipment to the value of $3,389,162.77 has been purchased during the year, consisting of twenty-one electric locomotives, three sleeping cars, one hundred and thirteen passenger coaches, four combination passenger and baggage cars, sixteen electric cars, three hundred and three coal cars, eight hundred and sixty-three box cars and one scale test car; this amount also includes the cost of converting forty-two passenger cars into cabooses and work equipment, twenty-two freight cars into work equipment and twenty box cars into cabooses. The entire amount was charged to Equipment Account.

The System taxes accrued during the year amounted to $4,949,094.53 as compared with $4,682,384.12 for the year 1911, an increase of $266,710.41 or 5.7 per cent.

The roads operated and controlled by your Company are not receiving the compensation to which they believe they are entitled for carrying the mails. It is estimated that the yearly loss suffered by reason of the inadequate pay allowed by the Post Office Department is in the neighborhood of three-quarters of a million dollars. It is admitted by the officials of that Department that the loss amounts to about four hundred thousand dollars, but this figure omits a charge to which the roads claim they are fairly entitled for the use of the property employed in the mail service.

Vigorous protest has been made against this injustice, but the Department claims it is powerless to afford relief without remedial legislation by Congress.

Until a recent decision of the United States Supreme Court it was supposed that railroads were well within the bounds of reason and just and fair treatment in expecting to collect from the Government a reasonable price for work which they had performed, but by that decision when a railroad undertakes to carry the mails it must not only give all the service required by law, but also all additional service required by the Postmaster General, and that for such service it could only receive what Congress had authorized. The remedy left to the railroad, as pointed out by the decision, was to stop carrying the mails. As no railroad could exist in any community if it refused to carry the mails, it will readily be seen that the remedy is nominal, not real.

The present laws, in the light of this decision, result in setting the common carriers of the country apart from all other instrumentalities of service and require them to involuntarily make a contribution for the benefit of a showing of economy and efficiency in the conduct of the Post Office Department, which in effect amounts to confiscation, disguised though it may be. The Post Office Department ought to be willing to pay its way the same as any other shipper, and Congress should enact such laws as will give to the railroads a fair compensation for such an indispensable service as mail transportation.

Pending legislation relating to the relations of the railroads to the proposed parcels-post system will result, if enacted into law, in still further loss. Assuming the passage of such a law, with the transfer of parcels-post to the mails the railroads will receive no compensation until the weighing period next after the law goes into effect. This period will come in the Autumn of 1916, so that the railroads will for four years be deprived of the revenue on parcels, which, if it were not for the parcels-post law, would have been sent by express, and be compelled to carry additional mail in the form of parcels-post for no compensation.

In 1904 the Company acquired control of the Central New England Railway Company, at which time the capital stock consisted of 31,500 preferred shares and 34,500 common shares, and it had outstanding $8,310,000 of bonds. Its capital stock at the present time consists of 37,500 preferred shares and 48,000 common shares, and it has outstanding bonds to the amount of $12,317,000.

Substantially all of the increase in the capital stock and indebtedness resulted from the mergers in 1907 of the Newburgh, Dutchess and Connecticut, Dutchess County, Poughkeepsie Bridge and Poughkeepsie and Eastern Railroad Companies, and to the refunding of the old First Mortgage Bonds.

During the period from 1904 to 1912 there has been spent in improvements and additions to the property, including new equipment, $4,625,622.91, and there is in contemplation further similar expenditures of about $2,500,000 to enable the company to economically and efficiently handle the large volume of business necessary to be done via the Poughkeepsie Bridge gateway.

The New York, New Haven & Hartford Railroad Company owns 37,184 preferred shares of the total of 37,500 shares, and 47,720 common shares of the total of 48,000 shares.

The New York, Ontario & Western Railway, in which your Company has a controlling interest, was unable under the conditions of business prevailing during the past year, and especially because of the anthracite coal strike, to earn the dividend it has paid for several years.

Petition has been filed with the Public Service Commission, Second District, New York State, for permission to acquire the outstanding minority interest in the stock of the Company with a view to merging the property with that of your Company by lease or otherwise as may seem desirable. It is believed by such merging the receipts may be so increased and the expenses so reduced that as good or better result may be obtained than by a separate and independent management as has heretofore obtained.

We have been disappointed in not having been able to secure the control we had expected to of the Rutland Railroad. The transfer of stock we had agreed to purchase of the New York Central & Hudson River Railroad Company was enjoined by the New York Courts, and no change of control is now possible until after trial of the case in Court.

While the loss resulting from this delay is serious we have thought it better not to yield to any demands of those who are promoting this litigation, lest by doing so in this case we encourage similar proceedings in other cases by persons who may desire to derive advantage from an interruption of important plans of a large corporation.

We are still of the opinion that the purchase is most desirable in the interest of the system of roads in the control of your company, and we believe had the purchase been completed the minority interest would have suffered no harm, but would have fared as well or better than the controlling interest, as has been the case with the Central New England and other companies added to the system of roads in your control.

With the burden of building up the property and earnings of the Rutland Railroad on our hands, however, we were unwilling at first to make a further investment than necessary to enable us to carry out without hindrance our plans for its development.

It has been deemed advisable by your Board of Directors to segregate the Company's interests in the water lines hitherto owned and operated by the New England Navigation Company, and accordingly a sale of the physical properties has been made to The New England Steamship Company, payment for which has been received in the capital stock and first mortgage bonds of that company.

This action has been taken, owing to legislation pending, and recently passed by Congress, requiring railroads to dispose of all interest in steamship lines with which they can or may compete. Our steamship lines have never been in themselves a source of much profit, but they have enabled us to give a better service than would have been possible had the business been confined to our rail lines, on account of better deliveries, especially in New York City.

Our interest in the Merchants & Miners Transportation Company has been of importance in protecting us in connection with our rail line connections and New England business generally has been promoted, we believe, by its control in our interest. Such control has not resulted in any increase in rates, but has, we believe, been a serious factor in some instances in preventing increases.

The construction of the New York Connecting Railroad is progressing; contracts have been awarded for steel work for Big Hell Gate Bridge and Ward's and Randall's Island Viaduct, for steel work for Little Hell Gate and Bronx Kill Bridges and approach viaducts, for masonry of Bronx Viaduct, for foundation and masonry work of Eastern Viaduct, for tower bases East River Bridge and for excavation and masonry from Woodside Avenue to Stemler Street. The execution of a first mortgage to secure an issue of four per cent. bonds not exceeding in the aggregate thirty million dollars has been approved by the Company. Such bonds when sold will be guaranteed jointly by The Pennsylvania Railroad Company and The New York, New Haven and Hartford Railroad Company.

The following sections of the line of the New York, Westchester and Boston Railway Company were opened for commercial service—on May 29th, 1912, from Adams Street, Borough of the Bronx, New York, to North Avenue, New Rochelle; on July 1st, 1912, from Columbus Avenue Junction, Mount Vernon, to Mamaroneck Avenue Station, White Plains; on August 3d, 1912, from Adams Street, Bronx, south to the junction with the Harlem River Branch of The New York, New Haven and Hartford Railroad Company near 174th Street and from Mamaroneck Avenue, White Plains, to the terminal of the line at Westchester Avenue, White Plains; and on August 3d, 1912, the train service was continued over the Harlem River Branch tracks of The New York, New Haven and Hartford Railroad Company to Willis Avenue, where connection is made with the Second and Third Avenue Elevated Railroads. The public patronage of these sections since their opening lends encouragement to the belief that further construction and contemplated connections and transfer facilities with the rapid transit lines of New York City will add very materially to the business of the road.

The Public Service Commission for the First District, New York, has approved the route for the extension of the Lenox Avenue Branch of the Subway, lying alongside the line of the New York, Westchester and Boston's line from 180th Street to Unionport Road.

Negotiations are now under way for the sale of so much of the Company's property as is required by the City for this route. The completion of this extension will mean a transfer point between the Westchester Company and the Subway. It is proposed that the station shall be joint and provide for transfer from one line to the other under cover.

The Lexington Avenue Subway, now under construction, will cross the Westchester Company's line near Westchester Avenue in the Bronx, which will make a third transfer point for Westchester Company passengers to New York City rapid transit lines. This will give the Company connection with two East Side lines, a line through the middle of Manhattan and one on the West Side.

The third-tracking of the Second Avenue and Third Avenue Elevated will greatly improve the service via these lines; the Second Avenue Elevated is the shortest route to the lower part of Manhattan.

The interest on the advances by The New York, New Haven and Hartford Railroad Company for account of the New York, Westchester and Boston Railway Company amounted on June 30th, 1912, to $1,675,489.96. As this money has not been repaid to the treasury no credit thereof has been taken in the Income Account of the Company, but is held in suspense for consideration as a credit to Income or Profit and Loss Account when repaid.

It is expected, and was estimated, this property would have to be carried for about three years from the opening of the same for business before it could become self-sustaining.

Your Company's ownership of the capital stock of Boston Railroad Holding Company now consists of 31,065 shares of common stock, the entire issue, and 244,939 shares of preferred stock out of a total of 272,939.

The Holding Company's investment in Boston and Maine Railroad consists of 219,189 shares of common stock out of a total of 395,050 and of 6,543 shares of preferred stock out of a total of 31,498.

The dividends received on the Boston and Maine stock, with available cash on hand, were insufficient for the year by $148,741.48 to pay taxes, administration expenses and the dividend of four per cent. upon the preferred shares of the Holding Company, which amount was provided by your Company out of income under its guaranty of such dividend.

The rehabilitation of the Boston and Maine Railroad has so far progressed and the outlook for improvement in operating results is so favorable as to justify the expectation that the Road will be able to increase the rate of dividend on the common stock without impairment of service or diminishment of provision for adequate maintenance and up-keep of the property, to an extent which will enable the Holding Company to care for its obligations without recourse to your Company's guaranty.

This expectation, however, may not be realized if the Road, in common with other eastern railroads, is forced to yield to the existing demands of labor for advances in wages.

The rehabilitation of the Boston and Maine Railroad will require at least two more years' time before the property can satisfactorily handle the business of the section of the country it serves. Until then the patience of the public and the officials in charge will be severely taxed. It is not so much a question of money as of the necessary time in which the plans can be legally perfected and the money properly and economically expended.

The reconstruction and improvements of the Grand Central Terminal in New York by the New York Central and Hudson River Railroad Company are so near completion that it is expected the new station will be ready for occupancy by January 1, 1913.

Your Company participates in the interest on the cost of these expenditures proportionate to its use of the Terminal measured by the relative number of cars entering the Terminal.

As the railroad use of the approaches to the Terminal is confined to space below the street level it is the purpose of your Company to join with the Central Company in the utilization of the aerial rights and of the adjacent surplus real estate by the construction of buildings for commercial purposes under such terms of use as will not only return a good rate of interest on the investment but will result in a substantial reduction of the expense of operating and maintaining the Terminal.

A loft building has already been constructed and is now occupied at 46th and 47th Streets and Lexington Avenue; an office building at 49th and 50th Streets and Lexington Avenue is under construction and nearly completed; contracts have been made for the construction and occupancy of a hotel at 43d and 44th Streets and Madison and Vanderbilt Avenues, and for a store and office building at the corner of 42d Street and Vanderbilt Avenue; and there is contemplated the construction of a building for club purposes at the corner of 45th Street and Vanderbilt Avenue.

It is the expectation to eventually finance the necessary expenditures by means of a separate company whose capital stock shall be owned equally by your Company and the Central Company and whose obligations shall be guaranteed jointly by the two Companies.

The agreement with the New York Central and Hudson River Railroad Company to share equally in the net results of the operation of the Boston and Albany Railroad referred to in the last General Statement has been in force one year, and has substantially fulfilled expectation in its effect upon your Company's interests.

The direct charge upon our income has only been about $18,000, which has been more than counter-balanced by indirect benefits.

In consonance with a policy adopted by your Board of Directors to confine the activities of the company to the business of transportation a sublease, at a satisfactory rental, of the commercial electric and gas properties leased by your company in 1906 from the Connecticut Railway & Lighting Company was made, effective October 1, 1911, to The United Electric Light and Water Company.

This sub-lease covered the systems for the distribution of electrical energy, for other than railway purposes, in the towns of Waterbury, Naugatuck, Watertown, Cheshire, New Britain, Newington Berlin, Plainville, Southington, Norwalk, Wilton, New Canaan and Greenwich; the gas plants and distributing systems in the towns of Norwalk, Greenwich and Naugatuck; and the right to furnish gas and electricity in the town of Weston.

The capital stock of the Company has been increased during the year by the addition of 7,846 shares ($784,600.00) which have been issued in exchange for $1,176,900.00 of 3½% Convertible Debenture Certificates of the issue of January 1, 1906.

Of the total outstanding capital stock, 217,198 shares are in the treasuries of subordinate companies.

The outstanding indebtedness of the Company and its leased lines, in the hands of the public, has been increased during the year by the amount of $708,040.22, as follows:

INCREASES.

Four per cent. notes	$30,100,000.00
Four and one-quarter per cent. notes	220,000.00
Four and one-half per cent. notes	3,075,000.00
	$33,395,000.00

DECREASES.

Four per cent. notes paid	$ 1,919,959.78
Four and one-half per cent. notes paid	22,590,000.00
Four per cent. (1908) Debentures paid	3,100.00
Five per cent. Four Year Debentures paid	11,000.00
Five per cent. Five Year Debentures paid	6,676,000.00
Three and one-half per cent. Convertible Debenture Certificates exchanged for capital stock	1,176,900.00
Meriden Horse R. R. 1st Mortgage 5% Bonds paid	85,000.00
Plymouth & Middleboro R. R. 1st Mortgage 5% Bonds paid	225,000.00
	$32,686,959.78
NET INCREASE	$ 708,040.22

The capital stock of the Old Colony Railroad Company has been increased during the year by the sale of five thousand (5,000) shares, the proceeds of which have been applied toward the reimbursement of expenditures for betterments by your Company.

The property and franchises of the Plymouth and Middleboro Railroad Company, formerly leased to the Old Colony Railroad Company, were purchased by that company on November 28, 1911.

It has been deemed advisable to improve the facilities of the Boston and Providence Railroad Corporation by the construction of two additional main line tracks from Boston to East Junction, the elimination of grade crossings, and to adapt and equip the whole main line thus four-tracked for operation by the use of electricity as a motive power.

These improvements are estimated to cost about eight million dollars.

As the least of the Boston and Providence Railroad Corporation to the Old Colony Railroad Company made no provision for the payment by the lessor for improvements to its property, the cost of the work contemplated would fall upon your Company as lessee of the Old Colony unless other provision could be made for furnishing the necessary funds. The property to be improved being held by lease and not controlled through stock ownership, your Board did not feel that it should increase the direct obligations of the Company for such purpose. As a result of negotiations an agreement has been reached whereby the Boston and Providence Railroad Corporation is to mortgage its railroad, franchises and property to secure an issue of four per cent. seventy-five year bonds to the aggregate amount of eight million dollars, and The New York, New Haven and Hartford Railroad Company is to endorse its guaranty on said bonds.

The office facilities at the South Station, Boston, having become inadequate to accommodate the needs of the departments located in Boston for the purpose of securing a more efficient handling of the business, and to furnish necessary additional room for the official staff of the Boston and Albany Railroad, an addition to the building has been made by the Boston Terminal Company at an expenditure of about $425,000, which provides for twenty-seven additional office units on each of the three floors together with two passenger elevators, new freight elevator, stairway and toilets.

This addition has also provided much needed relief to the Boston and Maine Railroad, whose offices were greatly overcrowded, and has enabled a removal of the principal general offices of that company from the North Station to the South Station.

The special funds ordered by the Directors for the protection of the Company against losses by fire, catastrophies, etc., so that the expenses of no single year should be unduly burdened, have reached an amount sufficient for the purposes for which they were created and no further assessment of the operating expenses should be necessary unless the funds should be depleted as a result of disasters, which are improbable so far as the past history of the company furnishes a guide. For example, the assets in the Insurance Fund now amount to $1,953,883.93, and outside insurance has been purchased from the income of the Fund, which protects the Company against loss by any one fire in excess of $100,000.00 up to $1,000,000.00 and against a combination of losses in excess of $250,000.00 without limit.

Professor George J. Brush died at New Haven, Connecticut, on February 6, 1912, and the following minute was entered upon the records of the Board:

"Professor George J. Brush, a Director of this Company since October 18, 1893, and for many years previously a Director in the New Haven and Northampton Company, since merged into this Company, died at his residence in New Haven, Connecticut, February 6, 1912. The Directors desire to place on record their appreciation of the service he has rendered the Company, his devotion to its interests at all times, and the sense of personal loss they feel at his departure, though his life was one of long years and filled with honors such as it is given to but few of us to achieve.

"*Resolved:* That an engrossed copy of these minutes be sent by the Secretary to the members of his family."

The vacancy was filled by the election on February 15, 1912, of Mr. Augustus S. May of Bridgeport, Connecticut.

Mr. Amory A. Lawrence died at Boston, Massachusetts, on July 6, 1912, and the following minute was entered upon the records of the Board:

"The Board, with profound regret, learns of the death of Mr. Amory A. Lawrence on July 6, 1912, for four years last past a member of this Board.

"Faithful in attendance, conscientious in the discharge of his duty, and ever watchful of the interest of the Company, he will be sadly missed by his associates.

"*Resolved:* That a copy of these minutes be spread upon the records, and an engrossed copy sent to the family of Mr. Lawrence."

The faithful and efficient services of the officers and employes are hereby acknowledged.

By order of the Board of Directors,

CHARLES S. MELLEN,
President.

New Haven, Connecticut,
September, 19, 1912.

GENERAL BALANCE SHEET, JUNE 30, 1912.

THE NEW YORK, NEW HAVEN AND HARTFORD RAILROAD SYSTEM, EXCEPT NEW YORK, ONTARIO AND WESTERN RAILWAY COMPANY, BOSTON AND MAINE RAILROAD AND MAINE CENTRAL RAILROAD COMPANY.

ASSETS.

PROPERTY INVESTMENT:		
Road and Equipment	$225,377,244.93	
Floating Equipment, Street Railways and other properties	103,287,774.76	
	$328,665,019.69	
Less Reserve for Accrued Depreciation of Equipment	431,371.58	
Total	$328,233,648.11	
Securities:		
Securities of Proprietary, Affiliated and Controlled Companies:		
Stocks (Exhibit I)	$ 46,170,178.65	
Miscellaneous (Exhibit I)	10,235,399.59	
Total	56,405,578.24	
Other Investments:		
Advances to Proprietary, Affiliated and Controlled Companies for Construction, Equipment and Betterments	$ 1,033,541.25	
Miscellaneous Investments:		
Physical Property	8,313,362.35	
Securities (Exhibit II)	4,622,062.50	
Total	$ 13,968,966.10	
TOTAL PROPERTY INVESTMENT		$398,608,192.45
WORKING ASSETS:		
Cash	$ 28,417,437.21	
Marketable Securities (Exhibit III.)	47,322,269.83	
Loans and Bills Receivable	5,021,519.87	
Net Balance due from Agents and Conductors	3,564,156.59	
Miscellaneous Accounts Receivable	4,450,379.97	
Materials and Supplies	5,145,372.66	
Traffic and Car Service Balances due from other companies	657,736.18	
Other Working Assets	199,843.21	
TOTAL WORKING ASSETS		94,778,715.52
ACCRUED INCOME NOT DUE:		
Unmatured Interest, Dividends and Rents Receivable	659,659.75	
DEFERRED DEBIT ITEMS:		
Temporary Advances to Proprietary, Affiliated and Controlled Companies	$ 1,997,054.55	
Working Funds	167,387.15	
Rents, Insurance and Taxes paid in advance	57,838.35	
Special Deposits	129,703.65	
Unextinguished Discount on Securities	5,033.56	
Cash and Securities in Sinking and Redemption Funds:		
Connecticut Railway and Lighting Co. Sinking Fund	$ 562,652.42	
Worcester & Conn. Eastern Ry. Sinking Fund	78,000.00	
Total	$ 640,652.42	

Cash and Securities in Insurance and Other Reserve Funds:		
Insurance Fund	$ 994,199.53	
Accident and Casualty Fund	1,089,463.77	
Coal Insurance Fund	21,251.26	
Marine Insurance Fund, The New England Steamship Co.	85,359.66	
Total	$ 2,190,274.22	
Other Deferred Debit Items	4,707,575.87	
TOTAL DEFERRED DEBIT ITEMS		9,895,519.77
		$503,942,087.49

LIABILITIES.

STOCK:		
Capital Stock	$179,583,100.00	
Less, Held by Subsidiary Companies:		
The New England Navigation Co. $21,571,900.00		
The Rhode Island Co. 147,900.00		
	21,719,800.00	
	$157,863,300.00	
Premium realized on Capital Stock Sold (Since July 1, 1909)	$ 32,786,089.00	
Less premium on shares held by Subsidiary Companies	13,016,501.75	
	$ 19,769,587.25	
Capital Stock of Subsidiary Companies in hands of Public	93,313.22	
TOTAL STOCK AND PREMIUM REALIZED SINCE JULY 1, 1909		$177,726,200.47
MORTGAGE, BONDED AND SECURED DEBT:		
Mortgage Bonds, including Bonds of Merged Roads Assumed (Exhibit IV)	$ 60,876,000.00	
Less, Held in Treasury $201,000.00		
Held by the New England Navigation Co. 70,000.00		
	271,000.00	
	$ 60,605,000.00	
Plain Bonds, Debentures and Notes, including Debentures of Merged Roads Assumed (Exhibit V)	$143,716,300.00	
Less, Held in Treasury $ 1,650.00		
Held by The New England Navigation Co. 1,509,000.00		
	1,510,650.00	
	$142,205,650.00	
Funded Debt of Subsidiary Companies (Exhibit VI)	39,242,391.50	
TOTAL MORTGAGE, BONDED AND SECURED DEBT		242,053,041.50
WORKING LIABILITIES:		
Loans and Bills Payable	$ 34,533,000.00	
Traffic and Car Service Balances due to other companies	3,453,620.83	
Audited Vouchers and Wages Unpaid	5,806,420.76	
Miscellaneous Accounts Payable	61,639.82	
Matured Interest, Dividends and Rents Unpaid	5,400,335.43	
Matured Mortgage, Bonded and Secured Debt Unpaid	35,512.68	
Other Working Liabilities	143,558.10	
TOTAL WORKING LIABILITIES		49,434,087.62
ACCRUED LIABILITIES NOT DUE:		
Unmatured Interest, Dividends and Rents Payable	$ 3,339,511.95	
Taxes Accrued	22,153.62	
TOTAL ACCRUED LIABILITIES NOT DUE.		3,361,665.57
DEFERRED CREDIT ITEMS:		
Operating Reserves:		
Accident and Casualty and Insurance Funds	$ 3,855,759.20	
Other Operating Reserves	309,298.73	
	$ 4,165,057.93	
Other Deferred Credit Items	2,859,063.60	
TOTAL DEFERRED CREDIT ITEMS		7,024,121.53
APPROPRIATED SURPLUS:		
Reserves from Income or Surplus:		
Invested in Sinking and Redemption Funds:		
Connecticut Railway and Lighting Co. Sinking Fund.		443,688.85
EQUIPMENT AND PERSONAL PROPERTY LEASED		8,372,385.00
DEFERRED LIABILITY ACCOUNT NET ASSETS, CONNECTICUT RY. AND LIGHTING CO.		626,287.39
PROFIT AND LOSS ACCOUNT		14,900,609.56

Contingent Liabilities:

The New York, New Haven and Hartford Railroad Company is liable jointly with other roads for any deficiency on foreclosure of bonds of The Boston Terminal Company.

The New York, New Haven and Hartford Railroad Company guarantees four per cent. dividends on preferred stock of the Springfield Railway Companies, $3,387,900., and payment of principal at one hundred five per cent. on liquidation.

The New York, New Haven and Hartford Railroad Company guarantees four per cent. dividends on preferred stock of the New England Investment and Security Company, $4,000,000., and payment of principal at one hundred five per cent. on liquidation; also guarantees the payment of principal, $3,400,000., and interest of the New England Investment and Security Company fifteen-year Funding Gold Notes dated April 1st, 1909; also guarantees the payment of an additional $12,850,000. and interest of New England Investment and Security Company fifteen-year Funding Gold Notes dated April 1st, 1909, when requested to do so by John L. Billard, as per contract.

The New York, New Haven and Hartford Railroad Company guarantees the payment of principal and interest of the four and one-half per cent. First Mortgage Gold Bonds of the New York, Westchester and Boston Railway Company, dated July 1st, 1911, to the amount of $17,200,000.

The New York, New Haven and Hartford Railroad Company is liable jointly with the New York Central and Hudson River Railroad Company for any deficit in operations of the Boston and Albany Railroad.

Under the provisions of Section 4, Chapter 519, of the Acts of the General Court of the Commonwealth of Massachusetts, passed at its 1909 Session, The New York, New Haven and Hartford Railroad Company promises when they shall be sold to guarantee the principal of, and the dividends, and interest upon the capital stock, bonds, notes, and other evidences of indebtedness of Boston Railroad Holding Company acquired by it. On June 15th, 1910, the General Court of the Commonwealth of Massachusetts approved an Act authorizing the issue of preferred stock (without voting power) of Boston Railroad Holding Company, in exchange for its four per cent. fifty-year Debentures dated November 1st, 1909; and on January 10th, 1911, the $20,012,000. Debentures owned by The New York, New Haven and Hartford Railroad Company were exchanged for preferred stock. On June 30th, 1912, there were held by the public, 28,000 shares of preferred stock of Boston Railroad Holding Company, on which the guarantee had been executed; and on the same date, The New York, New Haven and Hartford Railroad Company held the following stock:

31,065 shares of Common Stock of par value	$ 3,106,500.00
244,939 shares of Preferred Stock of par value	24,493,900.00
	$503,942,087.49

STATISTICS.

PASSENGER TRAFFIC.	
Number of passengers carried earning revenue	84,534,214
Number of passengers carried one mile	1,558,915,723
Average distance carried Miles	18.44
Total passenger revenue (excluding mails, express, etc.)	$26,816,435.49
Average amount received from each passenger	.31723
Average receipts per passenger per mile	.01720
Total passenger service train revenue	$30,952,099.65
Passenger service train revenue per mile of road	$15,063.39
Passenger service train revenue per train mile	1.87735
FREIGHT TRAFFIC.	
Number of tons carried of freight earning revenue	24,675,469
Number of tons carried one mile	2,343,040,109
Average distance haul of one ton Miles	94.95
Total freight revenue (excluding miscellaneous)	$32,130,891.56
Average amount received for each ton of freight	1.30214
Average receipts per ton per mile	.01371
Freight revenue per mile of road	$15,869.7715
Freight revenue per train mile	4.00089
TOTAL TRAFFIC.	
Operating revenues	$64,933,064.63
Operating revenues per mile of road	$31,048.99
Operating revenues per train mile	2.66548
Operating expenses, including Taxes	$45,896,890.13
Operating expenses, including Taxes, per mile of road	$21,946.48
Operating expenses, including Taxes, per train mile	1.88405
Net operating revenue, less Taxes	$19,036,174.50
Net operating revenue, less Taxes, per mile of road	$9,102.51
TRAIN MILEAGE.—REVENUE SERVICE.	
Miles run by passenger trains	16,289,208
Miles run by freight trains	7,833,057
Miles run by mixed trains	197,889
Miles run by special trains	40,600
Total revenue train mileage	24,360,754
Non-revenue service train miles	1,268,321
Grand total train mileage	25,629,075
CAR MILEAGE, ETC.	
Mileage of passenger cars	79,164,105
Mileage of loaded freight cars—North or East	90,125,283
Mileage of loaded freight cars—South or West	60,909,256
Mileage of empty freight cars—North or East	16,834,374
Mileage of empty freight cars—South or West	45,298,409
Mileage of caboose cars	7,842,355
Average number of passengers per car mile	25
Average number of passengers per train mile	95
Average number of passenger cars per train mile	4.79
Average number of tons of freight per loaded car mile	15.52
Average number of tons of freight per train mile	291.75
Average number of freight cars per train mile	27.51
Average number of loaded cars per train mile	18.80
Average number of empty cars per train mile	7.73
Average mileage operated during year	2,091.31
Average mileage operated during year in Passenger Service	2,054.79
Average mileage operated during year in Freight Service	2,024.66